

Report for Vermont Department of Environmental Conservation: **Research on EPR Programs for HHW**

FINAL REPORT

February 7, 2019



The Product Stewardship Institute

The Product Stewardship Institute (PSI) is a national, membership-based nonprofit committed to reducing the health, safety, and environmental impacts of consumer products with a strong focus on sustainable end-of-life management. We believe that manufacturers have a responsibility to internalize the costs of safely managing, reusing, and recycling the products that they create. When manufacturers assume this responsibility, the result is reduced waste, lower environmental impacts, reduced costs for governments and taxpayers, and job creation. Headquartered in Boston, Mass., PSI takes a unique approach to achieving this vision by facilitating dialogues among diverse stakeholders to jointly develop effective product stewardship policies and programs for a wide array of consumer products. With members from 47 state environmental agencies and hundreds of local governments, and 120 corporate, academic, non-U.S. government, and organizational partners, we work to design, implement, evaluate, strengthen, and promote both voluntary and legislative product stewardship initiatives across North America.

Acknowledgements

This document was written by Suna Bayrakal, PSI Senior Associate for Policy and Programs, with editing and oversight by Scott Cassel, PSI Chief Executive Officer and Founder. PSI would like to thank representatives from the following agencies and organizations for their input on this document: Addison County Solid Waste Management District (VT), British Columbia Ministry of the Environment and Climate Change Strategy, Central Vermont Solid Waste Management District (VT), Chittenden Solid Waste District (VT), Manitoba Sustainable Development, Metro (OR), Ontario Ministry of the Environment and Climate Change, Product Care Association, Saskatchewan Ministry of the Environment, Smarter Sorting, Solid Waste Alliance Communities (VT), Special Waste Associates, the Vermont Department of Environmental Conservation, and the Vermont Product Stewardship Council.ⁱ

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1. Executive Summary

1.1 Overview

In 2017, the Vermont Department of Environmental Conservation (DEC) organized a multi-stakeholder process to improve the state’s household hazardous waste (HHW) management system. Stakeholders, which included solid waste districts, towns and alliances, haulers, trade associations, state representatives, hazardous waste contractors, and environmental non-profits, made recommendations on how HHW should be effectively and conveniently managed in a cost-effective manner. While the group came to agreement on the need for additional permanent facilities to safely manage HHW, there was no consensus on how best to fund this program. Various suggestions were discussed, including extended producer responsibility (EPR) legislation for HHW products. EPR is *“a mandatory type of product stewardship that includes, at a minimum, the requirement that the producer’s responsibility for their product extends to post-consumer management of that product and its packaging. There are two related features of EPR policy: (1) shifting financial and management responsibility, with government oversight, upstream to the producer and away from the public sector; and (2) providing incentives to producers to incorporate environmental considerations into the design of their products and packaging.”*ⁱⁱ

In 2018, an EPR for HHW bill, [H.560](#), was introduced in the Vermont legislature and passed the House. While the bill did not make it through the Senate, extensive stakeholder discussions highlighted the need to ensure a financially sustainable management system for HHW products that would be convenient for consumers and cost effective for municipalities.

1.2 Objectives

The **purpose of this report** is to address key questions that arose from a variety of stakeholders during Vermont’s H.560 legislative process, primarily focused on the scope of products and manufacturers that would be impacted by Vermont’s EPR for HHW bill, [H.560](#), as well as the estimated costs and benefits of implementing the bill. Specifically, this report examines:

1. the number of manufacturers affected and number of products covered;
2. the cost to implement the program;
3. recommendations for effective and efficient implementation of the HHW EPR program described in bill H.560;
4. the impacts of the program on collection convenience, municipal costs, and amount of toxic materials diverted from the waste stream; and
5. program and financing models other than EPR that could increase consumer convenience and reduce municipal costs.

1.3 Key Findings

This report highlights the following findings in response to key questions raised by stakeholders related to implementation of Vermont's EPR for HHW bill, H.560:

The number of manufacturers and products likely to be covered by the bill are estimated to include:

- Approximately 650 manufacturers, about 10 percent of whom manufacture an estimated 70 percent of the HHW coming into Vermont HHW facilities; and
- Approximately 1,800 products (including aerosols, hazardous cleaners, paint thinner, paint and varnish remover, pool cleaners, furniture stripper, automotive additives, adhesives, among others), based on recent data collected at Vermont's largest HHW facility.

The costs to implement the program, and local government costs savings, have been estimated in two phases of increasing convenience as required by H.560. Phase 1 maintains at least the current level of convenience (prior to July 1, 2020) and provides at least four collection events in counties without permanent facilities (a total of 119 collection events and 5 permanent facilities). Phase 2 meets Vermont's Materials Management Plan convenience requirements and establishes new permanent collection programs in counties that currently lack permanent facilities (29 collection events and 14 permanent facilities). In addition, two cost scenarios are provided for the new permanent facilities – one in which there are “satellite” permanent, but prefabricated or mid-size structures in smaller Vermont counties that will “feed” into larger, full-scale, permanent facilities in a contiguous county, and another in which there are “stand-alone” full service, permanent facilities in all but the smallest two counties (which have prefabricated satellite facilities). Current EPR programs are estimated to cover 42 to 54 percent of products coming into an HHW facility and other programs in Vermont cover an additional 5 to 15 percent. Bill H.560 is estimated to cover a further 25 to 28 percent, thus leaving 15 to 16 percent of HHW not covered (paid by local governments). Local government savings and stewardship organization costs are estimated based on the percent of HHW covered by H.560.ⁱⁱⁱ Costs and savings are estimated as follows:

- *Program Costs*
 - Phase 1 - July 1, 2020 to June 30, 2023: \$1,708,557 per year
 - Phase 2 - After June 30, 2023
 - Annual Operating Cost Range: \$1,614,760 to \$3,088,110
 - Satellite Scenario Capital Cost Range: \$3,440,000 to \$5,160,000
 - Stand-Alone Scenario Capital Cost Range: \$7,040,000 to \$10,560,000
- *Local Government Cost Savings Equivalent to Stewardship Organization Costs*
 - Phase 1 - July 1, 2020 to June 30, 2023: \$427,140 to \$478,400 per year
 - Phase 2 - After June 30, 2023
 - Annual Operating Cost Range: \$403,680 to \$864,670
 - Satellite Scenario Capital Cost Range: \$860,000 to \$1,444,800
 - Stand-Alone Scenario Capital Cost Range: \$1,760,000 to \$2,956,800
- *State Agency Costs*
 - Approximately \$50,000 per year, with more resources expected to be needed in the initial years when the program is first being implemented.

Bill H.560, as passed by the House, contributes to effective and efficient implementation by providing clear technical covered product definitions, a broad scope of covered products, sufficient state resources and authority to administer and enforce the program, allowing all local government collection programs to opt to be part of a collection plan, provisions for collection convenience in all Vermont counties, requirements for environmentally sound management, requiring that the stewardship organization cover the costs from collection through end-of-life management to help ensure that part of these costs do not fall to local governments and taxpayers, an adequate implementation time frame, and program plan and annual reporting requirements that include performance targets and other information essential to evaluating program performance, including its effectiveness and efficiency.

Recommendations to improve implementation of H.560 include:

- Consider the following options to reduce costs while still providing convenient collection:
 - Strategically placed regional facilities instead of a facility per county;
 - Smaller satellite facilities that feed into larger permanent facilities and suggested cost sharing between neighboring jurisdictions as outlined in the satellite scenario outlined above, or including larger groupings of full-scale and satellite facilities;
 - Expansion of existing facilities to serve one or more satellite facilities;
 - Use of facilities not currently routinely used as HHW collection facilities; and
 - Allow rural counties to be served by a seasonal facility or rover events that bring HHW back to one of the regional permanent facilities.
- Require a minimum county participation rate along with an average state-wide participation rate to ensure that a strong performing county does not bring up the average state-wide participation rate while allowing individual counties to lag in performance.
- Require a minimum number of hours of operation for collection facilities as part of the convenience standard.
- Provide for penalties for violation of the law and discretionary authority for the state agency to impose penalties for not meeting performance goals.
- Include broader requirements for environmentally sound management beyond compliance with applicable environmental laws.
- Require a comparison of current year and prior year participation rates in the annual report.

The potential impacts on Vermont’s HHW management system of an EPR for HHW program under bill H.560 are expected to include:

- *Collection Convenience:* 180 percent increase, with nine new permanent collection sites
- *Local Government Cost Savings:*
 - Phase 1 - July 1, 2020 to June 30, 2023: \$427,140 to \$478,400 per year
 - Phase 2 - After June 30, 2023
 - Annual Operating Cost Range: \$403,680 to \$864,670
 - Satellite Scenario Capital Cost Range: \$860,000 to \$1,444,800
 - Stand-Alone Scenario Capital Cost Range: \$1,760,000 to \$2,956,800
- *Material Diverted:* 197 additional tons per year diverted in the first two years of the program, reducing HHW landfilled to 443 tons (from current rate of 640 tons/year) by the 2nd year.

Evaluation of four program model alternatives to EPR -- including the Vermont Pesticide Product Registration Program, tire fee model, state grants/funds, and voluntary industry product stewardship -- indicated that while these alternatives may provide some funding to reduce local government HHW management costs, they do not generally provide *sustainable* funding, increase resident convenience, or increase collection and proper management of unwanted consumer products. Beyond municipal cost reduction and increased convenience, education and funding have been identified by state and local governments as key issues that also need to be addressed. When compared to the alternative models, EPR is the only approach that addresses all four desired programmatic aspects -- relieves local governments of the financial burden of HHW, increases convenient collection for residents, increases awareness through education and outreach, and provides sustainable funding. Furthermore, EPR programs are more likely to ensure that collection services are accessible to residents throughout the state, not just in urban or more highly populated areas.

2. Introduction

2.1 Background and Purpose

In 2017, the Vermont Department of Environmental Conservation (DEC) organized a multi-stakeholder process to improve the state’s household hazardous waste (HHW) management system. Many household products – including aerosols, hazardous cleaners, varnish and paint remover, automotive additives, adhesives, furniture stripper, lubricants, rust and tar removers, and pool chemicals – contain hazardous ingredients that are toxic, corrosive, flammable, chemically reactive, or unsafe for the environment and human health. These products therefore often require special handling once consumers no longer need them, and are then classified as household hazardous waste (HHW).

Stakeholders, which included solid waste districts, towns and alliances, haulers, trade associations, state representatives, hazardous waste contractors, and environmental non-profits, made recommendations on how HHW should be effectively and conveniently managed in a cost-effective manner. While the group came to agreement on the need for additional permanent facilities to safely manage HHW, there was no consensus on how best to fund this program. Various suggestions were discussed, including extended producer responsibility (EPR) legislation for HHW products. EPR is *“a mandatory type of product stewardship that includes, at a minimum, the requirement that the producer’s responsibility for their product extends to post-consumer management of that product and its packaging. There are two related features of EPR policy: (1) shifting financial and management responsibility, with government oversight, upstream to the producer and away from the public sector; and (2) providing incentives to producers to incorporate environmental considerations into the design of their products and packaging.”*^{iv}

In the U.S., EPR legislative proposals for products categorized as HHW are intended to increase the safe management of hazardous products not currently addressed by product-specific EPR legislation (e.g., batteries, paint, mercury thermostats). These hazardous products, if not properly managed, pose environmental, health, and safety risks, including risks of child poisonings, fires, and spills. Although the U.S. Environmental Protection Agency sets stringent requirements for hazardous waste generated by businesses, it does not regulate similar wastes generated in the home. Residents therefore often unknowingly put dangerous HHW in the trash, down the drain, or store it improperly for extended periods of time.

In Vermont, an EPR for HHW bill, [H.560](#), was introduced in the legislature in 2018 and passed the House. While the bill did not make it through the Senate, extensive stakeholder discussions highlighted the need to ensure a financially sustainable management system for HHW products that would be convenient for consumers and cost effective for municipalities. EPR for HHW legislation exists or has also been pursued in the U.S. and Canada as follows:

- Metro, a regional government comprising Portland, **Oregon’s** metropolitan area, has worked with the Oregon legislature to introduce EPR for HHW bills in recent years ([HB 2772](#) and [SB 96](#) in 2019, [HB 4126](#) in 2018, [HB 3105](#) in 2017, and [HB 3251](#) in 2015).
- In **Canada**, EPR for HHW programs have been successfully operating since 1997 (in British Columbia), with new programs added in 2008 (Ontario) and in 2012 (Manitoba).

For the purposes of this report, HHW means the following, as defined in H.560 as passed by the House^v:

“Covered household hazardous product’ means a consumer product offered for retail sale that is contained in the receptacle in which the product is offered for retail sale, if the product has any of the following characteristics:

- (i) The physical properties of the product meet the criteria for characteristic wastes under the federal Resource Conservation and Recovery Act of 1976, Pub. L. No. 94-580, as amended, including ignitability, corrosivity, reactivity, or toxicity as defined in 40 C.F.R. §§ 261.20-261.24.*
- (ii) The physical properties of the product meet the criteria for designation as a class 2, 3, 4, 5, 6, or 8 hazardous material, as defined in 49 C.F.R. part 173, by the U.S. Department of Transportation under the Hazardous Materials Transportation Act of 1975, 49 U.S.C. §§ 5101-5128, as amended.*
- (iii) The product is a marine pollutant as defined in 49 C.F.R. § 171.8.*
- (iv) The product is a hazardous waste under chapter 159 of this title or rules adopted under that chapter.”*

The **purpose of this report** is to address key questions that arose from a variety of stakeholders during Vermont’s H.560 legislative process, primarily focused on the scope of products and manufacturers that would be impacted by Vermont’s bill, as well as the estimated costs and benefits of implementing the bill. Specifically, this report examines:

1. the cost to implement the program;
2. the number of manufacturers affected and number of products covered;
3. the impacts of the program on collection convenience, municipal costs, and amount of toxic materials diverted from the waste stream;
4. recommendations for effective and efficient implementation of the HHW EPR program described in bill H.560; and
5. program and financing models other than EPR that could increase consumer convenience and reduce municipal costs.

2.2 Approach to Research

PSI gathered data and other information on manufacturers, products, collection costs and quantities, impacts of EPR programs on HHW management and product costs, lessons learned about implementation, and alternatives to EPR that could yield convenience to residents and reduce local government costs. The research for this project was conducted through review of existing information about Vermont’s HHW programs, discussions with Canadian and U.S. government representatives (state, provincial, and local) and other experts who oversee or are familiar with HHW programs, relevant PSI reports, including those that evaluate or examine the cost and other impacts of EPR programs, and on-line research (including program plans and annual reports from Canadian EPR for HHW programs in three provinces, state stewardship reports, and other relevant documents).

3. Manufacturers and Products

Key questions that arose from a variety of stakeholders during Vermont's H.560 legislative process included those regarding the approximate number and range of manufacturers and products that would be impacted by the bill. This report provides information regarding manufacturers and products that would have been subject to the H.560 HHW EPR program as passed by the House (Bill H.560) as follows:

- Number of manufacturers
- List of the major manufacturers;
- Number of products; and
- Types of products.

PSI identified manufacturers and products primarily through a review of Chittenden Solid Waste District's (CSWD) recent HHW collection data scanned and compiled by Smarter Sorting from approximately November 16, 2018 to December 15, 2018.^{vi} Data from CSWD, which has the largest HHW permanent facility in Vermont, is expected to be indicative of, and provide a good representation of, manufacturers and their products that are sold and generated as HHW in Vermont and that come into HHW facilities in the state. This data was supported by information obtained from other sources including:

- A list of approximately 170 producers obligated under Canadian HHW EPR programs provided by Product Care Association, the stewardship organization operating these programs in British Columbia, Manitoba, and Ontario;
- Membership lists of the [Household & Commercial Products Association](#) (HCPA), a major national trade association that attended Metro's Product Stewardship for HHW Stakeholder Meetings in 2017.
- Product Care's product acceptance guidance for the Manitoba EPR for HHW program ([Manitoba Paint and HHW Accepted and Not Accepted Products Lists for PCA Members](#)). Of the three Canadian provinces with EPR HHW programs, Manitoba's program has the broadest product scope and most closely resembles H.560; and
- On-line regional retailer search of products covered under H.560.

PSI also contacted the Vermont Retail & Grocers' Association and the Associated Industries of Vermont (who both attended VT DEC's 2017 HHW Stakeholder Group Meetings) as well as the Vermont Chamber of Commerce, Vermont Department of Labor, Aubuchon Hardware in Montpelier, Ace Hardware in Burlington, Ace Hardware's northeast regional distribution center, and Ace corporate headquarters, but was unable to access relevant product or manufacturer data. PSI also sought information from the Consumer Product Safety Commission, which had extensive product data. Unfortunately, this information was not in a form readily amenable to identification based on H.560 covered product criteria. PSI also pursued product lists from Product Care Association and Canadian provincial governments, but this information was either not available or was not able to be shared.

Based on PSI's review, approximately 650 manufacturers were identified as potentially manufacturing products covered under H.560 that would be sold and generated as HHW in Vermont. From Chittenden's data, approximately 400 manufacturers were identified as those that make products that are collected as HHW covered under H.560. An additional 250 manufacturers who are members of HCPA and/or that were identified from an on-line regional retailer search of H.560 product categories could also potentially manufacture products covered under H.560. An estimated 70 percent (by weight) of the HHW collected at CSWD's facility that would be included in H.560 is from products made by ten percent of the

manufacturers. The top 20 manufacturers contributed almost 60 percent of products collected (by weight) and are listed below, in rank order, based on the weight of their products coming into the facility:

1. RPM International Inc
2. The Sherwin-Williams Company
3. Reckitt Benckiser Group plc.
4. S.C. Johnson & Son, Inc.
5. The Clorox Company
6. W. M. Barr
7. 3M
8. Henry Company
9. Zep Inc.
10. BISSELL Homecare, Inc.
11. Weiman Products, LLC
12. Turtle Wax, Inc.
13. Colgate-Palmolive Company
14. Spectrum Brands
15. Dap Products Inc.
16. Church & Dwight Co., Inc.
17. Rug Doctor LLC
18. Miracle Sealants Company
19. Sopus Products
20. Arch Chemicals, Inc.

The names of several of these manufacturers also appear on Product Care’s list of producers obligated under Canadian HHW EPR programs as well as membership lists for [Household & Commercial Products Association](#) (HCPA) and the [American Cleaning Institute](#) (ACI). This list of manufacturers is not an exhaustive list, but includes the major manufacturers expected to be obligated under H.560.

PSI’s review also identified approximately 1,800 products that are expected to be included in H.560’s “covered household hazardous product” definition. According to bill H.560 as passed by the house, “covered household hazardous product” means a consumer product offered for retail sale that is contained in the receptacle in which the product is offered for retail sale, if the product has any of the following characteristics:

- (i) The physical properties of the product meet the criteria for characteristic wastes under the federal Resource Conservation and Recovery Act of 1976, Pub. L. No. 94-580, as amended, including ignitability, corrosivity, reactivity, or toxicity as defined in 40 C.F.R. §§ 261.20-261.24.
- (ii) The physical properties of the product meet the criteria for designation as a class 2, 3, 4, 5, 6, or 8 hazardous material, as defined in 49 C.F.R. part 173, by the U.S. Department of Transportation under the Hazardous Materials Transportation Act of 1975, 49 U.S.C. §§ 5101-5128, as amended.
- (iii) The product is a marine pollutant as defined in 49 C.F.R. § 171.8.
- (iv) The product is a hazardous waste under chapter 159 of this title or rules adopted under that chapter.^{vii}

The types of products can be generally sorted into the following categories:

- Aerosols
- Automotive additives
- Flammable degreasers
- Flammable lubricants
- Flammable liquid adhesives
- Furniture stripper
- Glues and adhesives
- Grout cleaner
- Hazardous cleaners
- Hobby and craft supplies
- Kerosene
- Lighter fluid
- Masonry cleaner
- Mineral Spirits
- Paint thinners
- Paint and varnish remover
- Pool and hot tub cleaners
- Rust remover
- Tar and bug remover
- Turpentine

The number of products indicated above is expected to be roughly within the range of products expected to be covered under H.560. It is not a fully comprehensive list but is anticipated to include the major products expected to be covered by bill H.560. These products were identified as part of a scan of incoming hazardous waste from the largest HHW facility in Vermont and, therefore, provide a high probability that they are representative of the likely range and types of products to be collected in a Vermont HHW facility.

4. Annual Costs to Implement the Program

Key questions that arose from stakeholders during Vermont's H.560 legislative process included those regarding the costs to implement this bill and who would bear these costs. This section provides the estimated annual cost to implement an HHW EPR program as described in the H.560 proposed legislation, as passed by the House.^{viii} This section also provides estimated state agency costs for oversight, administration, and enforcement and expected local government cost savings for collecting products covered under the HHW EPR program.

Cost estimates were determined based on a range of data from various sources, including the Vermont DEC, CSWD, Addison County Solid Waste Management District (ACSWMD), and other jurisdictions and experts with information on HHW programs and EPR programs for a variety of products. A range of costs is provided, where possible and appropriate, to allow for uncertainty and variation, including program operating hours and other aspects of the HHW collection and management system. Cost calculations are based extensively on 2016 HHW management data provided by VT DEC and assumed to be sufficiently representative of the annual quantities of materials expected to be collected and costs incurred at VT HHW facilities and collection events.^{ix}

4.1 Program Costs

The cost to implement an HHW EPR program as required in bill H.560 includes collection, transportation, processing, education, administration, reporting, and other program costs. H.560 specifies that collection costs include facility and equipment costs, maintenance, and labor (Section 7183 (b)(2)). These costs are estimated based on convenience requirements specified in H.560 and include the costs for the collection of all materials and products collected by HHW facilities and events (including those covered under H.560) and not *only* the products covered under H.560. Existing HHW facilities and events collect various types of hazardous materials and products, which include those that are covered under H.560. The collection and management of non-H.560 HHW materials and products are funded by existing stewardship and other programs as well as local governments and is described in more detail in Table 9.

4.1.1 Convenience Requirements

H.560 requires a phased approach to increasing convenient collection of HHW as follows:

Phase 1 – July 1, 2020 to June 30, 2023

- Maintain at least the current level of convenience provided by programs in operation prior to July 1, 2020
- Provide at least four collection events in counties without permanent collection programs. Note that some counties already have more than 4 events.

Phase 2 – After June 30, 2023

- Hold 29 collection events to meet the requirements of Vermont's Materials Management Plan.^x
- Establish nine new permanent collection programs in counties that currently lack a program. Note that there are 14 counties in Vermont, five with existing permanent facilities.

The level of convenience provided by facilities in operation in 2016, which is the most recent data provided by the Vermont DEC,^{xi} includes 110 collection events and five permanent facilities in Vermont's 14 counties, as shown in Table 1 below. PSI assumed this will be the same level of convenience in operation prior to July 1, 2020.

Table 1. Vermont's Current Level of Convenience^{xii}

| County | Permanent Facility? | 2016 Events |
|--------------|---------------------|-------------|
| Addison | Yes | 0 |
| Bennington | No | 2 |
| Caledonia | Yes | 14 |
| Chittenden | Yes | 16 |
| Essex | No | 6 |
| Franklin | Yes | 6 |
| Grand Isle | No | 0 |
| Lamoille | No | 3 |
| Orange | No | 2 |
| Orleans | No | 6 |
| Rutland | Yes | 31 |
| Washington | No | 7 |
| Windham | No | 11 |
| Windsor | No | 6 |
| TOTAL | | 110 |

**Note that current events are organized by Solid Waste Management Entity (SWME) and not by county.*

4.1.2 Phase 1 Annual Costs – July 1, 2020 to June 30, 2023

From July 1, 2020 to June 30, 2023, the level of convenience required by H.560 includes the five existing permanent facilities in Vermont and the addition of 9 collection events for a total of 119 collection events annually. Table 2 provides further detail regarding the collection system during this time period.

Table 2. Phase 1 – Increase in Level of Convenience required by H.560

| County | Permanent Facility? | 2016 Events | Additional Events in Non-Facility Counties | Total Events as of July 2020 |
|-------------------|---------------------|-------------|--|------------------------------|
| Addison | Yes | 0 | 0 | 2 |
| Bennington | No | 2 | 2 | 4 |
| Caledonia | Yes | 14 | 0 | 3 |
| Chittenden | Yes | 16 | 0 | 0 |
| Essex | No | 6 | 0 | 4 |
| Franklin | Yes | 6 | 0 | 2 |
| Grand Isle | No | 0 | 4 | 4 |
| Lamoille | No | 3 | 1 | 4 |
| Orange | No | 2 | 2 | 4 |
| Orleans | No | 6 | 0 | 4 |
| Rutland | Yes | 31 | 0 | 6 |
| Washington | No | 7 | 0 | 7 |
| Windham | No | 11 | 0 | 10 |
| Windsor | No | 6 | 0 | 4 |
| TOTAL | | 110 | 9 | 119 |

**Note that current events are organized by SWME and not by county.*

4.1.2.1 Collection Event Costs

Based on data compiled by the Vermont DEC, 2016 costs for HHW collection events in VT ranged from \$2,250 to \$24,418 per event, with the average cost at \$5,135 per event.^{xiii} These costs include labor, disposal, set-up fee, advertising and outreach, training, and miscellaneous costs (e.g., municipal solid waste disposal, roll-off container, toilet rental, and traffic police). Total HHW event costs for 110 events in 2016 were approximately \$564,800. Using this data, the annual costs for 119 collection events in VT for Phase 1 is expected to be approximately \$611,060.

4.1.2.2 Existing Facility Costs

Based on data compiled by the Vermont DEC, 2016 HHW collection facility costs ranged from \$44,500 to \$648,057, with costs for all five facilities totaling \$1,097,497.^{xiv} These costs include labor, disposal, advertising and outreach, training, and facility costs. Facility costs include utilities and fuel, permits, lease, capital costs (amortized annual costs), legal fees, insurance, maintenance, equipment and supplies, overhead, municipal solid waste disposal, and personal protective equipment. See Table 3 below for details.

Table 3. Existing Facility Annual Costs^{xv}

| Existing Facilities | Annual Costs* (based on 2016 data) |
|---|------------------------------------|
| Northeast Kingdom Waste Management District | \$44,500 |
| Rutland County Solid Waste District | \$201,718 |
| Addison County Solid Waste Management District | \$105,317 |
| Chittenden Solid Waste District | \$648,057 |
| Northwest Vermont Solid Waste Management District | \$97,905 |
| Total | \$1,097,497 |

**Includes capital and operating costs*

4.1.3 Phase 2 Annual and Capital Costs – After June 30, 2023

In this phase, the collection system will hold 29 collection events (see Table 4 below), but also add nine new permanent facilities to the five existing facilities such that there will be one permanent facility in each of Vermont’s 14 counties.^{xvi} **Two cost scenarios are provided for the new permanent facilities** – one in which there are “satellite” permanent, but prefabricated or mid-size structures in smaller Vermont counties that will “feed” into larger, full-scale, permanent facilities in a contiguous county, and another in which there are “stand-alone” full service, permanent facilities in all but the smallest two counties (which have prefabricated satellite facilities).

Table 4. Vermont’s Collection Events After June 30, 2023^{xvii}

| County | Permanent Facility? | Total Events |
|------------|---------------------|--------------|
| Addison | Yes | 2 |
| Bennington | Yes | 3 |
| Caledonia | Yes | 1 |
| Chittenden | Yes | 2 |
| Essex | Yes | 2 |
| Franklin | Yes | 3 |
| Grand Isle | Yes | 0 |
| Lamoille | Yes | 1 |
| Orange | Yes | 1 |
| Orleans | Yes | 2 |
| Rutland | Yes | 3 |
| Washington | Yes | 2 |
| Windham | Yes | 4 |
| Windsor | Yes | 3 |
| TOTAL | | 29 |

4.1.3.1 Collection Event Costs

In this phase, the collection system will offer 29 events to meet requirements under 2014 Vermont's Materials Management Plan that requires that each household have access to a HHW collection event or permanent facility within a 15 mile radius, and if a town or area does not have access within 15 miles, additional HHW events must be offered in the town or area.^{xviii} As noted previously, based on data compiled by the Vermont DEC, 2016 costs for HHW collection events in VT ranged from \$2,250 to \$24,418 per event, with the average cost at \$5,135 per event.^{xix} For 29 events, the total cost is estimated to be \$148,920.

4.1.3.2 Existing Facility Costs

As noted previously, the 2016 HHW facility annual costs for all five existing facilities totaled \$1,097,497. Table 3 above provides additional details.

4.1.3.3 New Facility Costs

New facility costs were calculated based primarily on information obtained from Special Waste Associates^{xx} but also corroborated with other sources.^{xxi} The operating costs are based on a range of costs reported from U.S. HHW collection facilities and in some cases do not include all local staff and administrative costs. The capital costs are very rough general estimates and do not reflect any site-specific conditions for Vermont jurisdictions or accounting for local design, labor, or construction costs. The following information is used in calculating new facility costs:

- **Operating Costs**
 - \$60 to \$100 per customer
 - Estimated Participation Rate: 5 to 15 percent of households
 - *Operating Costs = (Households x Participation Rate) x (Operating Cost per Customer)*
- **Capital Costs**
 - \$20,000 to \$30,000 for prefabricated buildings to serve as collection sites for the two counties with the smallest number of households (less than 3,000) and which can feed into neighboring "hub" facilities that are full-scale and permanent. These "satellite" collection sites could provide a high level of collection convenience and service without the need to provide full-scale facility operations.
 - \$100,000 to \$150,000 for mid-size HHW facilities to serve counties with a small number of households (approximately 10,000 to 20,000) and which can feed into neighboring "hub" facilities that are full-scale and permanent. These "satellite" collection sites could also provide a high level of collection convenience and service without the need to provide full-scale facility operations.
 - \$1 million to \$1.5 million for "hub" full-scale, permanent facilities to serve larger counties and neighboring county "satellite" facilities.

The capital costs above for new facilities do not include cost of land and grading, nor installing utilities, pavement, fencing, methane-mitigation (if cited near a landfill), or permitting, and assumes no expansion costs for existing facilities. It is common for local jurisdictions to provide locations for HHW facilities on

property already owned by the public (co-located with local government recycling centers, landfills, waste transfer stations, and other facilities) and the cost burden of a new facility is expected to be reduced if new HHW collection sites can be established in partnership with existing sites. However, co-locating at a landfill may also incur significant costs such as on-site methane mitigation systems, which can require substantial additional design and construction costs. Existing conditions and available utilities at such properties varies widely. However, to provide a general magnitude of additional costs, PSI reviewed HHW facility siting and cost studies,^{xxii} conducted a brief on-line review of current commercial/industrial land listings in Vermont realtor databases, and solicited information from a Vermont real estate appraiser. PSI estimates the following:

- Land costs could range from approximately \$20,000 per acre to \$100,000 per acre;
- Fencing could incur 5 to 6 percent of capital costs;
- Grading could incur 1 to 3 percent of capital costs;
- Permitting could incur 1 to 10 percent of capital costs; and
- Utilities could incur 4 percent of capital costs.

The two scenarios provided on the following pages are expected to give an overview of two possible different approaches to the H.560 convenience standard and the associated costs of establishing new facilities.

Satellite Facility Scenario

To reduce costs while still providing local collection points in every county, one approach could be to establish “satellite” permanent collection sites in the smallest counties that “feed” into larger permanent facilities in a contiguous county. In the satellite facility scenario, the satellite facilities would only collect HHW, but the wastes would be shuttled to a nearby full-scale facility where waste consolidation and processing prior to more economic, full truckload shipping would occur. This would require coordination and possible cost sharing between neighboring jurisdictions. A suggested grouping is provided below in Table 5 based on a high-level review of the political geography of Vermont and existing facility locations but is not necessarily optimized for transportation or other considerations.

Table 5. Satellite Facility Scenario Cost Estimates for Nine Counties Without Facilities

| Potential Groups | Households | Capital Cost - Low | Capital Cost - High | Annual Operating Cost – Low* | Annual Operating Cost – High** |
|---|------------|--------------------|---------------------|------------------------------|--------------------------------|
| Washington | 24,581 | \$1,000,000 | \$1,500,000 | \$73,740 | \$368,715 |
| Lamoille | 10,342 | \$100,000 | \$150,000 | \$31,030 | \$155,130 |
| Orange | 12,306 | \$100,000 | \$150,000 | \$36,920 | \$184,590 |
| Windsor | 24,184 | \$1,000,000 | \$1,500,000 | \$72,550 | \$362,760 |
| Windham | 19,011 | \$100,000 | \$150,000 | \$57,030 | \$285,165 |
| Bennington | 15,399 | \$100,000 | \$150,000 | \$46,200 | \$230,985 |
| Orleans | 11,360 | \$1,000,000 | \$1,500,000 | \$34,080 | \$170,400 |
| Essex | 2,691 | \$20,000 | \$30,000 | \$8,070 | \$40,365 |
| Grand Isle (satellite of Franklin or Chittenden) | 2,905 | \$20,000 | \$30,000 | \$8,720 | \$43,575 |
| TOTALS | | \$3,440,000 | \$5,160,000 | \$368,340 | \$1,841,685 |

*Based on an estimated 5 percent household participation rate and \$60/customer.

**Based on an estimated 15 percent household participation rate and \$100/customer.

Stand-Alone Permanent Facility Scenario

A second option to meet the H.560 convenience standards is to develop primarily “stand-alone” full-scale permanent facilities in each county, with only the smallest counties (Grand Isle and Essex) as “satellite” facilities. Table 6 below provides a summary of the estimated range of costs associated with this approach.

Table 6. Stand-Alone Facility Scenario Cost Estimates for Nine Counties Without Facilities

| COUNTIES | Households | Capital Cost - Low | Capital Cost - High | Annual Operating Cost – Low* | Annual Operating Cost – High** |
|--------------------------|------------|--------------------|----------------------|------------------------------|--------------------------------|
| Bennington | 15,399 | \$1,000,000 | \$1,500,000 | \$46,200 | \$230,985 |
| Essex ⁺ | 2,691 | \$20,000 | \$30,000 | \$8,070 | \$40,365 |
| Grand Isle ⁺⁺ | 2,905 | \$20,000 | \$30,000 | \$8,720 | \$43,575 |
| Lamoille | 10,342 | \$1,000,000 | \$1,500,000 | \$31,030 | \$155,130 |
| Orange | 12,306 | \$1,000,000 | \$1,500,000 | \$36,920 | \$184,590 |
| Orleans | 11,360 | \$1,000,000 | \$1,500,000 | \$34,080 | \$170,400 |
| Washington | 24,581 | \$1,000,000 | \$1,500,000 | \$73,740 | \$368,715 |
| Windham | 19,011 | \$1,000,000 | \$1,500,000 | \$57,030 | \$285,165 |
| Windsor | 24,184 | \$1,000,000 | \$1,500,000 | \$72,550 | \$362,760 |
| TOTALS | | \$7,040,000 | \$ 10,560,000 | \$368,340 | \$1,841,685 |

*Based on an estimated 5 percent household participation rate and \$60/customer.

**Based on an estimated 15 percent household participation rate and \$100/customer.

+Satellite of Orleans full-scale permanent facility

++Satellite of Franklin or Chittenden existing full-scale permanent facility

In comparing the two scenarios, new facility capital costs in the satellite scenario are estimated to be about half those of the stand-alone approach. Operating costs are estimated to be similar for both the satellite and stand-alone scenarios, as they are based on cost per customer and participation rates, which already have a large range of variability. Operating cost estimates for these facilities may vary based on other factors, including operating hours and disposal costs, among others. Operating costs typically increase over time as the public becomes more aware of the available service, with high participation rates at the 15 percent level achieved over a number of years.^{xxiii}

4.1.4 Total Estimated Costs

The summarized estimated costs in Table 7 and 8 are the total costs for implementation inclusive of collection costs for all of the types of types of hazardous materials and products that HHW programs collect in conjunction with H.560 HHW materials and products.

Table 7. Annual Costs: Phase 1 – July 1, 2020 to June 30, 2023

| Collection System Aspect | Cost |
|--------------------------|--------------------|
| Collection Events (119) | \$611,060 |
| Existing Facility Costs* | \$1,097,497 |
| TOTAL | \$1,708,557 |

*Includes capital and operating costs

Table 8. Annual and Capital Costs: Phase 2 – After June 30, 2023

| Collection System Aspect | Cost |
|--|--|
| Collection Events (29) – Annual Cost | \$148,920 |
| Existing Facility Costs – Annual Cost* | \$1,097,497 |
| New Facilities – Satellite Scenario | |
| <i>Annual Operating Cost Range</i> | \$368,340 to \$1,841,690 |
| <i>Capital Cost Range</i> | \$3,440,000 to \$5,160,000 |
| New Facilities – Stand-Alone Scenario | |
| <i>Annual Operating Cost Range</i> | \$368,340 to \$1,841,690 |
| <i>Capital Cost Range</i> | \$7,040,000 to \$10,560,000 |
| TOTAL | Range of Annual Operating Costs: \$1,614,760 to \$3,088,110 Range of Capital Costs – Satellite: \$3,440,000 to \$5,160,000 Range of Capital Costs – Stand-Alone: \$7,040,000 to \$10,560,000 |

*Includes capital and operating costs

4.1.5 Additional Considerations and Assumptions

As mentioned above, these two scenarios are designed to provide an overview of possible approaches to the H.560 convenience standard and a rough estimate of the range of their associated costs. A more detailed analysis in consultation with individual communities and counties may reveal different, more efficient and cost-effective approaches to the convenience requirements of H.560 that could result in incurring the lower end of this range of capital costs. In some instances, local conditions and costs may result in costs higher than portrayed here. Additional possible approaches, which might control costs, could involve: 1) the expansion of existing permanent HHW collection sites to serve a larger number of “satellite” facilities; 2) larger groupings of full-scale and satellite facilities; and/or 3) the use of facilities not currently routinely used as HHW collection facilities. For example, an existing facility built in the early 1990s in Windsor County (Hartford Vermont Recycling and Waste Management Center) is not currently being used for HHW collection. However, this facility provides a central location and existing infrastructure that could be a basis for a regional collection site. This facility was [evaluated in 2017](#) to determine the viability of using the existing building as a regional collection hub for household and small business hazardous waste generators in the region and is likely to be suitable for that purpose.^{xxiv}

Of the three existing Canadian HHW EPR programs, Manitoba's most closely resembles Vermont in terms of product scope and is closest in population (though approximately double that of Vermont). In 2017, the fifth year of operation of Manitoba's program, the stewardship organization (Product Care) incurred costs of approximately \$1.22 million for a program that included the collection convenience provided by 22 facilities and 17 events.^{xxv} Vermont's figure of \$1.6 million above for annual operating costs appear comparable (although in the low range) to those of the Manitoba program.

Note that these costs do not account for the savings that will be accrued from HHW diverted from the landfill and will therefore not incur a landfill tipping fee. The annual amount diverted will vary and is uncertain, but cost savings could be up to an estimated \$73,600 if diversion occurs for *all 640 tons of HHW that is estimated to be landfilled annually*^{xxvi} at an approximate cost of \$115 per ton tipping fee^{xxvii}. There are also potentially significant cost impacts not quantified here of HHW not being diverted from the waste stream. These cost impacts include possible spill containment and clean up, as well as other costs to address negative effects on the environment and public health.

4.2 Local Government Cost Savings and Stewardship Organization Costs

Vermont local government cost savings are estimated to be roughly equivalent to the projected costs associated with the proportion of “covered household hazardous products” (as defined under H.560) collected at local government facilities.^{xxviii} To conduct these calculations, PSI multiplied the full costs of the program by the estimated proportion, by weight, of covered products coming into an HHW facility. As shown in Table 9, current EPR programs cover 42 to 54 percent of products coming into an HHW facility and other programs in Vermont cover an additional 5 to 15 percent. PSI estimates that **Bill H.560 will cover a further 25 to 28 percent of HHW currently collected in Vermont local government HHW facilities**, thus leaving 15 to 16 percent of costs that will continue to be borne by local governments. These estimates were primarily derived from data provided by CSWD and ACSWMD in Vermont, but supported with other data from a variety of sources, including Metro Oregon, a 2009 HHW facility data summary of

five locations across the U.S., and data from HHW collection events held from 2013 to 2016 by the Greater Upper Valley Solid Waste Management District in Vermont.^{xxix}

These local government cost savings will be funded by the manufacturers through the stewardship organization. Section 7183(b)(3)(A) of H.560 requires that the stewardship plan allow all municipalities to decide if their collection programs and facilities will be part of the stewardship organization’s collection plan. Manufacturers may establish collection programs for products covered under H.560 separate from municipal collection programs and facilities that are not part of the stewardship organization’s collection plan. In this case, manufacturers would incur the total capital costs specified in Section 4.1 (Tables 7 and 8) and operating costs commensurate with the scope of products they collect. Although the stewardship organization’s portion of the cost is expected to be 25 to 28 percent of the total estimated costs, it is possible that 100 percent of the collection infrastructure would need to be funded (where there are no existing facilities) in order to meet the convenience standard outlined in H.560. However, if manufacturers partner with local governments, a portion of those costs could be covered.

Table 9. Proportion of HHW Materials Covered and Not Covered Under H.560

| Products Collected at HHW Facilities | Estimated Range of HHW Materials Collected (Percent by Weight) ^{xxx} |
|---|---|
| Covered Under H.560 | |
| Acids | 0.4 to 0.7 percent |
| Aerosols | 0.9 to 3.0 percent |
| Bases | 0.4 to 0.6 percent |
| Flammable/Solvents (e.g., paint thinner) | 5.9 to 7.9 percent |
| Hypochlorite | 0.0 to 0.4 percent |
| Oil Base Paint and Paint Lab Pack (not PaintCare program) | 8.1 to 9.9 percent |
| Oxidizers | 0.2 to 0.4 percent |
| Photochemicals | 0.0 to 0.2 percent |
| Reactives | 0.0 to 0.2 percent |
| Toxics | 0.1 percent |
| Used Oil | 5.9 to 7.7 percent |
| TOTAL | 25 to 28 percent |

| Products Collected at HHW Facilities | Estimated Range of HHW Materials Collected (Percent by Weight) |
|---|---|
| Covered by Existing Vermont EPR Programs | |
| Batteries (Call2Recycle Program) | 4.3 to 5.0 percent |
| Fluorescent Bulbs | 5.0 to 6.7 percent |
| Mercury Devices/Thermostats/Auto Switches | 0.0 to 0.1 percent |
| Paint (PaintCare) | 29.7 to 44.3 percent |
| TOTAL | 42 to 54 percent |
| Covered by Other Programs | |
| Pesticides | 1.6 to 2.5 percent |
| Lead Acid Batteries | 1.9 to 13.4 percent |
| TOTAL | 5 to 15 percent |
| Not Covered (paid by local governments) | |
| Antifreeze | 2.1 to 2.8 percent |
| Asbestos | 0 percent |
| Batteries (not Call2Recycle program) | 0.0 to 0.1 percent |
| Cylinders/Compressed Gas/Propane | 0.0 to 0.1 percent |
| Flammable Debris | 0.3 to 0.8 percent |
| Flammable/Solvents (e.g., dirty gasoline) | 0.0 to 5.9 percent |
| Lead Debris | 0.0 to 0.4 percent |
| Mercury Debris | 0.1 to 0.3 percent |
| Nonhazardous (e.g., cleaners that do not fall under RCRA) | 0.0 to 3.8 percent |
| Non PCB Capacitors | 0.0 percent |
| Oily Debris | 1.2 to 1.6 percent |
| PCB Capacitors and Ballasts | 0.0 to 0.3 percent |
| Water/Oil Mix | 0.2 to 0.8 percent |
| Oil Filters | 0.4 to 9.5 percent |
| TOTAL | 15 to 16 percent |

Products in the “Not Covered” category above are not included in H.560 because they either do not meet the H.560 “covered household hazardous product” definition or are specifically excluded by the bill. For example, a product that is not “contained in the receptacle in which the product is offered for retail sale” will not be covered, nor will products that are “intended to be rubbed, poured, sprinkled on, sprayed on, introduced into, or otherwise applied to the human body or any part of a human for cleansing, moisturizing, sun protection, beautifying, promoting attractiveness, or altering appearance, unless designated” by the state agency. However, Vermont law requires Solid Waste Management Entities (SWMEs) to collect non-regulated HHW and landfill-banned materials. Furthermore, outreach and education to the public needs to be clear that all materials that are hazardous, regardless of inclusion in H.560, should be brought to HHW facilities or events to ensure proper management and protection of public health and the environment.

Cost saving estimates are summarized below in Tables 10 and 11 for the two time periods in which increasing convenience is being phased in – from July 1, 2020 to June 30, 2023, and after June 30, 2023.

Table 10. Annual Local Government Cost Savings Equivalent to Stewardship Organization Costs: Phase 1 – July 1, 2020 to June 30, 2023

| Collection System Aspect | Savings/Costs (25-28% of Total Cost) |
|--------------------------|--------------------------------------|
| Collection Events (119) | \$152,770 to \$171,100 |
| Existing Facility Costs | \$274,370 to 307,300 |
| TOTAL | \$427,140 to \$478,400 |

Table 11. Local Government Annual and Capital Costs Savings Equivalent to Stewardship Organization Annual and Capital Costs: Phase 2 – After June 30, 2023

| Collection System Aspect | Savings/Costs (25 -28 % of Total Cost) |
|--|---|
| Collection Events (29) – Annual Savings/costs | \$37,230 to \$41,700 |
| Existing Facility Costs – Annual Savings/Costs | \$274,370 to \$307,300 |
| New Facilities – Satellite Scenario | |
| <i>Annual Operating Cost Range</i> | \$92,080 to \$515,670 |
| <i>Capital Cost Range</i> | \$860,000 to \$1,444,800 |
| New Facilities – Stand-Alone Scenario | |
| <i>Annual Operating Cost Range</i> | \$92,080 to \$515,670 |
| <i>Capital Cost Range</i> | \$1,760,000 to \$2,956,800 |
| TOTAL | Range of Annual Operating Costs: \$403,680 to \$864,670 Range of Capital Costs – Satellite: \$860,000 to \$1,444,800 Range of Capital Costs – Stand-Alone: \$1,760,000 to \$2,956,800 |

4.2.1 Additional Estimates and Considerations

Metro, Oregon, which serves a population of 1.5 million, has estimated that it will save \$1.8 million for an HHW program operated under an EPR system for its 59,000 customers.^{xxxi} In 2016, Vermont served approximately 25,000 customers. Extrapolating Oregon's projected cost savings to Vermont, based solely on customers served, results in a projected savings for Vermont of up to \$763,000 annually, which is in the middle of the range of annual operating cost savings in Table 11 above. Vermont's Solid Waste Management Entities (SWMEs) currently spend approximately \$1.6 million annually to manage HHW.^{xxxii}

An increase in collection (and associated management costs) of non-covered products may occur with an increase in collection convenience for residents. However, a 2015 study of paint EPR programs in Vermont and four other states presents the following noteworthy findings related to this issue^{xxxiii}:

- Most HHW programs saved money through the PaintCare program, as 76% of respondents indicated their paint-related program costs decreased through participation in the PaintCare program, and 60% responded that overall program costs decreased.
- HHW programs that save money through PaintCare most frequently use cost savings to reduce their overall budget or to offset costs of managing other products.

4.3 State Agency Costs

The program will require the state agency to administer and enforce the EPR for HHW program. These responsibilities include plan review, a public comment process, annual report review, audit review, registration, and enforcement. Based on a review of a variety of sources^{xxxiv}, the state agency cost to implement the program is estimated to be about \$50,000 per year, with more resources expected to be needed in the initial years when the program is first being implemented (e.g., for initial program plan review and registration of a large number of producers).

5. Effective and Efficient EPR for HHW Program Implementation

Bill H.560 contains key elements that contribute to effective and efficient implementation of an HHW EPR program:

- ***Product scope and administration and enforcement resources to ensure effective management of programs containing large numbers of products and manufacturers.***
 - Clear technical definitions of the covered products to provide manufacturers with a straightforward means to determine if they must participate;
 - A broad scope of covered products similar to the broadest scope in Canadian HHW EPR programs that includes products used or purchased by conditionally exempt generators;
 - Requirements for manufacturers to provide a publicly available producer and product brand list, which helps competitors identify potential free riders/noncompliant manufacturers; and
 - Sufficient provisions (resources and authority) to empower the state government to enforce participation and compliance on manufacturers and maintain a level playing field, including funding to cover state agency costs of administering and enforcing the law. These responsibilities include plan review, a public comment process, annual report review, audit review, registration, and enforcement activities.^{xxxv}
- ***Government coordination and convenient product collection.***
 - Prioritizing existing local government collection sites in the collection system by allowing all municipal collection programs and facilities to opt to be part of a collection plan;
 - Specifying provisions for collection convenience in all counties in Vermont; and
 - Requiring that the stewardship organization cover the costs of covered product management, from collection of products from the public through processing and end-of-life management (including facility and equipment costs, maintenance, and labor), to help ensure that part of the end-of-life management costs do not fall to local governments and taxpayers. The plan is required to include how municipalities will be compensated for all costs associated with collection of covered household hazardous products.
- ***Encourages environmentally sound management of products.***
 - Bill H.560 requires the stewardship organization to include in its stewardship plan: *“Compliance with appropriate environmental standards. In implementing a collection plan, a stewardship organization shall comply with all applicable laws related to the collection, transportation, and disposal of hazardous waste. A stewardship organization shall comply with any special handling or disposal standards established by the Secretary for covered household hazardous products or for the collection plan of the manufacturer.”*
- ***An adequate implementation time frame*** for manufacturers to establish and implement the program, and for state and local governments to prepare for their roles in program implementation.
- ***Performance targets and other information essential to evaluating program performance***, including its effectiveness and efficiency.

Recommendations to improve the effective and efficient implementation of Vermont’s EPR for HHW program include:

- **Consider the following options to reduce costs while still providing convenient collection:**
 - **Strategically placed regional facilities** instead of a facility per county;
 - **Smaller satellite facilities that feed into larger permanent facilities and suggested cost sharing between neighboring jurisdictions** as outlined in the satellite scenario outlined above or including larger groupings of full-scale and satellite facilities;
 - **Expansion of existing facilities** to serve one or more satellite facilities;
 - **Use of facilities not currently routinely used as HHW collection facilities;** and
 - **Allow rural counties to be served by a seasonal facility or rover events** that bring HHW back to one of the regional permanent facilities.
- **Include penalties for violation of the law to maintain a level playing field for all obligated producers, and also discretionary authority for the state oversight agency to impose penalties for not meeting performance goals.** In Section 7183 (Collection Plans), the state agency may require the stewardship organization to revise the collection plan if the participation rate goal is not met. In addition, consider providing the state agency the authority to also impose penalties for failure to meet performance goals.
- **Include broader requirements for environmentally sound management** beyond compliance with applicable environmental laws required in Section 7183(b)(5).^{xxxvi}
 - Specifically define environmentally sound management to include audits and inspections, record keeping, tracking and documentation of the fate of covered products from collection through final disposition, compliance with worker health and safety requirements, and environmental liability insurance.
 - Require the collection plan to describe how the stewardship organization will provide for the environmentally sound management of covered products.
 - Require the annual report to include an explanation of how environmentally sound management was achieved.
 - Specifically include an audit of the environmentally sound management of covered products as part of the existing audit requirement in H.560.
- **Require a minimum county participation rate along with an average state-wide participation rate** to ensure that the participation rate requirement does not permit a strong performing county to bring up the average state-wide participation rate while allowing individual counties to lag in performance.
- **Require a minimum number of hours of operation** for collection facilities as part of convenience standard.
- **Add a public awareness performance goal**, which can help drive education/outreach efforts. Both British Columbia and Manitoba’s HHW EPR programs have public awareness targets that require a given percentage of the population to be aware of a program to collect and recycle program products. The stewardship organization conducts consumer awareness surveys on a periodic basis to determine to what extent consumers are aware of the product stewardship program, the location of collection facilities, and how to manage products in a safe manner.
- **Require a comparison of current year and prior year participation rates** in the annual report.

6. Impacts of EPR Program on HHW Management

The potential impacts of an EPR program on HHW management include, but are not limited to, collection convenience, potential financial savings for municipalities, and toxic material diverted from the waste stream. These are examined here through a review of results from:

- Canadian EPR for HHW programs;
- Studies of potential EPR impacts on HHW programs in other jurisdictions;
- Vermont’s existing EPR programs; and
- EPR for other product areas in other jurisdictions.

6.1 EPR for HHW Program Results

EPR for HHW programs in Canada have achieved notable increases in collection of HHW and reduced improper disposal of products that include solvents, flammable liquids, gasoline, toxics, corrosives, and pesticides. Table 12 below shows data for two provinces that indicates **significant increases in the number and percent of collection sites as well as HHW volumes collected**. Manitoba’s program, which includes the broadest scope of products, increased collection volumes by 419 percent from the start of the program to 2017. In British Columbia, collection volumes increased by 365 percent and collection sites increased by 63 percent between 2001 and 2017. While British Columbia’s program started in 1997, 2001 is the first program year for which Product Care’s annual reports were readily accessible. Responsibility for, and operation of, Ontario’s program has transitioned since the program began in 2008 and is now shared between Stewardship Ontario and Product Care. This has resulted in the data being less amenable to consolidation and presentation here.

Table 12. Canadian HHW EPR Program Results^{xxxvii}

| Province | Product Scope | Increase in Number (%) of Collection Sites | Past Collection Volume | 2017 Collection Volume | Percent Increase in Collection Volumes |
|--------------------------------------|---|--|-----------------------------|------------------------|--|
| British Columbia 2001-2017 | solvents; flammable liquids; gasoline; pesticides | +74 (63%) | 28,188 gallons (2001) | 131,125 gallons | 365%; 8.72% annual increase year over year (2010-2016) ^{xxxviii} |
| Manitoba 2012-2017 | flammables; corrosives; physically hazardous toxics; environment- ally hazardous toxics | +21 (2,100%) | 2,613 gallons (2012) | 13,553 gallons | 419% |

British Columbia has the largest number of EPR programs among Canadian provinces and is one of the leading implementers of EPR programs in North America. It has conducted assessments of the economic and environmental impacts of its 11 EPR programs (against a theoretical status quo scenario in which no EPR program had been implemented), most recently in 2016.^{xxxix} The 2016 assessment states that the “*data suggests there are substantial environmental and financial benefits from EPR programs operating in BC in 2014.*”^{xi} Results from this assessment relevant to EPR for HHW are provided below in Table 13 and indicate that **EPR has generated collection rates over 35 percent higher than would have been achieved without EPR, and also contributed to significant avoided costs, job creation and environmental impacts.** Note that impacts shown have been consolidated for both HHW and paint, as these products are managed together in one program in BC. The results indicated below include those for paint whose volumes tend to be significantly larger than those of other, non-paint HHW such as solvents and pesticides. However, it is important to also keep in mind for non-paint HHW that “*some EPR programs recover relatively small quantities of designated materials, but have significant benefits in reducing environmental contamination and environmental risk avoidance to water, land and air by keeping hazardous materials out of landfills, energy recovery facilities/incinerators and the environment.*”^{xi} Improved management of these products is not quantified in Table 13 below, but still presents qualitative benefits. Based on 2017 sampling data in Ontario, which has a more narrow covered product scope than bill H.560, only about 10 percent of solvents and 50 percent of aerosols collected were included in the EPR for HHW program.^{xlii} In Manitoba, the covered product percentage (including EPR programs for products other than HHW) is approximately 75 percent.

Table 13. British Columbia Paint and HHW EPR Program Results^{xliii}

| Result Type | Result | Notes |
|---------------------------------------|---|--|
| Collection Rate | 1.5 lbs/capita (EPR) vs. 1.1 lbs/capita (without EPR) | |
| Avoided Costs | \$200,000 to \$500,000 (Canadian dollars) | <ul style="list-style-type: none"> • Avoided landfilling and mixed waste (garbage) collection costs |
| Job Creation | 12 to 27.5 jobs | <ul style="list-style-type: none"> • Includes staff at stewardship organization and consolidation facility, and for product transport |
| Environmental Impacts | | <ul style="list-style-type: none"> • Does not include avoided costs of pollution and environmental mitigation that would have been needed if materials had been landfill disposed. • HHW disposed of in the environment or to the wastewater/stormwater system is not considered in the analysis. All quantities not collected in the EPR program were assumed landfilled. |
| <i>Net Landfill Space Savings</i> | 3745 to 8566 cu.yd. | |
| <i>Net reduction in GHG Emissions</i> | 3372 to 3611 tons CO ₂ equivalents | |

As mentioned previously, Metro, a regional government in the Portland, Oregon area, has worked with the Oregon legislature to introduce EPR for HHW bills in recent years. As part of these efforts, Metro has examined the implications an EPR program would have on HHW management in their jurisdiction, with a product scope that is similar to that of H.560, but also includes pesticides (approximately 3 percent of total HHW volume). For example, Metro has estimated reduced municipal costs (cost savings) of approximately 48.6 percent for Metro’s HHW facility.^{xiv}

6.2 Results from EPR Programs for Other Products

While there are no EPR for HHW programs currently in the U.S., EPR programs exist for many other products in 33 states and the District of Columbia. There are currently 115 EPR laws in the U.S. at the state and local level that cover 14 product areas (including electronics, batteries, paint, mercury-containing thermostats and lamps, and mattresses among others). A sampling from these programs, both in Vermont and elsewhere, can provide a general sense for the possible benefits an EPR for HHW program can have.

6.2.1 Results from Existing EPR Programs in Vermont

Regarding the state’s six existing EPR programs – for auto switches, primary batteries, electronics, fluorescent lamps, paint, and thermostats -- Vermont’s 2014 Materials Management Plan states that *“Extended producer responsibility and product stewardship programs have addressed many barriers of cost and convenience to the general population. Many states, including Vermont, have successful program for proper recycling of such products as fluorescent bulbs, mercury thermostats, paint, and electronic wastes through regulated programs. These extended producer responsibility programs have been adopted at an increasing rate and have allowed for convenient options for disposal...EPR and product stewardship programs not only offer collection services in more convenient locations, but they also shift the burden of disposal costs from taxpayers and municipalities to manufacturers and the consumer.”*^{xiv} Information on Vermont’s EPR programs obtained from VT DEC’s Biennial Reports on Solid Waste is summarized below in Table 14 and show that there were significant increases in collection sites and convenience as well as quantities of materials collected. These results of Vermont’s EPR programs show not only what can be achieved in terms of collection, but that Vermont has had significant success in these programs; in three of the programs (electronics, lamps, and thermostats), VT is a national leader. In a fourth program, primary batteries, Vermont is the first in the U.S. to implement legislation in this product area and is seeing very significant results.

Table 14. Performance of Existing Vermont EPR Programs^{xlvi}

| Product Area | Starting Year of Program | Convenience | Impacts |
|-----------------------|--------------------------|--|--|
| Electronics | 2011 | Over 100 collection sites | <ul style="list-style-type: none"> • Highest per capita collection rate nationally; considered one of the most convenient/effective electronics recycling programs in the country • In 1st program year, 4.8 million lbs. were collected, which exceeded the legislative goal of 3.4 million lbs/year • Despite challenges from volatile recycling markets, material recycled increased from 4.8 million to 4.9 million lbs from 2011-2016 • Pounds declining due to fewer cathode ray tubes (CRTs) and smaller/lighter devices |
| Mercury Lamps | 2012 | Over 150 collection sites | <ul style="list-style-type: none"> • Highest recovery and per capita collection rates nationally • In the 1st program year, 37% of mercury lamps were recycled, significantly higher than the national average of less than 5% • Each year, from 2012 to 2016, the number of lamps collected increased, from approximately 125,000 lamps to 233,820 lamps. |
| Mercury Thermostats | 2010 | Over 160 collection sites | <ul style="list-style-type: none"> • Highest per capita collection rate nationally • 166.6 lbs mercury collected since program start |
| Mercury Auto Switches | 2007 | 70 participating collection sites | <ul style="list-style-type: none"> • 5,606 switches and 12.34 lbs of mercury collected since program started in 2007 |
| Primary Batteries | 2014 | 98% population within 10 miles of a collection site | <ul style="list-style-type: none"> • Collection of primary batteries has increased by 2,300% since program started • Collection of rechargeable batteries has increased by 43% since program started |
| Paint | 2014 | 99.5% of the population within 15 miles of a collection site | <ul style="list-style-type: none"> • Since program start, collection has increased by an average of 78% and 72 year-round collection sites have been established (and seasonal HHW events have supplemented convenience) • As of 2017, collected almost double the paint that was collected in VT prior to program start • Highest recovery rate of all state programs |

6.2.2 Results from Existing Non-HHW EPR Programs in Other Jurisdictions

As mentioned previously, there are currently no EPR for HHW programs in the U.S. However, states with programs for other products can provide insights on how material collection has been advanced by EPR in other jurisdictions. Below are a few examples from Maine (see Table 15), Connecticut, and other jurisdictions.

Table 15. Performance of EPR Programs in Maine^{xlvii}

| Product Area | Year Law Passed | Impacts (2015 data) |
|---------------------|-----------------|---|
| Electronics | 2005 | <ul style="list-style-type: none"> Since EPR law passed, over 82 million pounds have been collected and recycled Since 2006, electronics recycling has increased from 3.13 lbs/capita to 9.52 lbs/capita. |
| Mercury Lamps | 2009 | <ul style="list-style-type: none"> Collection sites increased from 149 program sites in 2011 to 307 program sites in 2015 Program recycling rate increased from 1% in 2011 to 12% in 2015 |
| Mercury Thermostats | 2005 | <ul style="list-style-type: none"> Prior to the EPR program, annual thermostat collections from 2001-2005 ranged from 3.8 to 15.6 per 10,000 residents. After EPR law implementation, collections increased slowly at first, with a more significant increase in annual collections occurring in 2007-2015 when the \$5 incentive was added into the program, with a range of 36.1 to 52.9 thermostats collected per 10,000 residents. Average annual collections are approximately 5,000 thermostats/yr, at least 40 % higher than rates prior to EPR |
| Paint | 2014 | <ul style="list-style-type: none"> In the first 9 months of the program, 96 year-round collection sites were established throughout the state Collection system provides a permanent collection site within 15 miles of 93.5% of Maine’s population, exceeding the 90% goal set in statute |

In 2015, PSI evaluated Connecticut’s EPR programs for **electronics, mercury thermostats, paint, and mattresses** to understand the economic and environmental gains that its programs achieved in the state.^{xlviii} The four EPR programs:

- Diverted more than 26 million pounds of materials from waste;
- Yielded a cumulative cost savings of more than \$2.6 million per year to CT municipalities;
- Provided services worth \$6.7 million;
- Led to the creation of more than 100 jobs;
- Reduced greenhouse gas (GHG) emissions by more than 13 million kg of carbon equivalent; and
- Provide nearly all Connecticut residents with convenient access to recycling collection sites for the target products.

Additional studies highlight the positive job and economic impacts associated with product stewardship and recycling. In a review of ten major studies in this area conducted between 2008 and 2012 that were state, provincial, or national in scope^{xix}, major findings included:

1. **Recycling and materials diversion generates significantly more jobs** than landfill disposal;
2. Recycling and the **use of secondary materials create significantly higher net value added and jobs at higher income levels** than waste disposal; and
3. **Recycling businesses create jobs closer to home and have a smaller environmental footprint** than businesses that rely on raw material extraction and manufacture.

6.3 Summary of Potential Vermont HHW EPR Impacts

Given the results of existing EPR for HHW programs in Canada and EPR for other products in the U.S., as well as studies of potential impacts, there is a high likelihood that a manufacturer-funded HHW EPR program with an increase in collection convenience mandated by H.560 will increase collection volumes, reduce municipal costs, divert material from improper disposal to protect the environment, and create jobs. Vermont’s significant experience and success with its existing EPR programs, leading many of them nationally, bodes well for implementation of EPR for an additional product area.

In Vermont, it is estimated that 640 tons or more of HHW is disposed of in landfills per year.^l This does not include products that might be put down the drain (sanitary or storm) or dumped in the environment. In addition, existing collection infrastructure includes five permanent facilities and 110 collection events. Table 16 summarizes some of the possible impacts of an EPR for HHW law in Vermont, including **increasing collection convenience by 180 percent and diverting more than 30 percent of the HHW currently landfilled.**

Table 16. Summary of Potential EPR Impacts on Vermont’s HHW Management Systemⁱⁱ

| Impact Category | Estimated Result | Percent Increase Resulting from EPR |
|------------------------|---|---|
| Collection Convenience | +9 new permanent collection sites | 180% |
| Municipal Cost Savings | Annual Operating Cost Range: \$403,680 to \$864,670 Satellite Capital Cost Range: \$860,000 to \$1,444,800* Stand-Alone Capital Cost Range: \$1,760,000 to \$2,956,800* | N/A |
| Material Diverted | 197 additional tons diverted in the first 2 years of the program, reducing HHW landfilled to 443 tons by 2 nd year | 8.72% annual increase year over year ⁱⁱⁱ from a baseline of 1084 tons of waste managed and 640 tons currently landfilled |

** Two cost scenarios are provided for the new permanent facilities – one in which there are “satellite” permanent, but prefabricated or mid-size structures in smaller Vermont counties that will “feed” into larger, full-scale, permanent facilities in a contiguous county, and another in which there are “stand-alone” full service, permanent facilities in all but the smallest two counties (which have prefabricated satellite facilities).*

7. Alternative Program Models

This section provides a brief overview of possible alternative program models that could provide Vermont residents with convenient HHW collection opportunities and relieve municipalities of the expense of managing HHW. Table 17 summarizes key aspects of four alternatives to EPR and suggests that while these alternatives to EPR may provide some funding, they do not generally provide *sustainable* funding, increase resident convenience, or increase collection and proper management of unwanted consumer products.

Table 17. Alternative Program Models

| Model | Reduces Municipal Cost? | Specifically Provides for Resident Convenience? | Additional Considerations |
|--|---|---|--|
| Vermont Pesticide Product Registration Program (Note that H.560 does not include household pesticides in its scope.) | Yes, but does not cover full costs of HHW management | No | <ul style="list-style-type: none"> Allocates funding for education related to proper purchase, application, and disposal of household pesticides Unlike model EPR programs, lacks performance measures to evaluate program effectiveness |
| Tire Fee Model | Varies - may or may not cover the cost of recycling/disposal of scrap tires and cleanup of illegally dumped tires | No | Unlike model EPR programs, lacks: <ul style="list-style-type: none"> performance measures to evaluate program effectiveness, education/outreach requirements to increase consumer awareness sustainable funding (may or may not cover the cost of recycling/disposal) |
| State Grants/Funds | Yes, but generally does not cover full costs of HHW management | No | <ul style="list-style-type: none"> Not sustainably funded May be intermittent |
| Voluntary Industry Product Stewardship | Yes, but generally does not cover full costs of HHW management | May provide increased convenience | <ul style="list-style-type: none"> Voluntary programs for batteries and mercury thermostats have low recycling rates. VT has found it necessary to pass EPR laws to increase recycling rates. Not sustainably funded May be intermittent, may not provide consistent recycling service to citizens throughout the state Does not provide level playing field |

Pesticide Fee: Professional and homeowner use of pesticides are regulated by the Vermont Agency of Agriculture, Food and Markets under the Vermont Regulation for the Control of Pesticides. These regulations cover proper use, storage, and disposal of pesticides. Product registration, applicator certificates, dealer licenses, and permits may be required for use of certain pesticides. Homeowners and professionals are responsible for proper disposal of all unused pesticides. Under the Vermont Pesticide Product Registration program, pesticides sold in Vermont must be registered with the state and pay a registration fee to the state. Part of this fee helps fund disposal of pesticides collected by local governments, however, the program does not have a mechanism to achieve convenience.

Tire Fee: Thirty-seven states require that a state tire fee be paid; this fee is usually understood as a visible fee paid by a consumer at retail into a government managed fund. State fees are typically used to pay for the costs of government staffing and enforcement of scrap tire management regulations, market development (research, grants, loans, and incentives), municipal and county grants, and stockpile abatement. There is little to no role for manufacturers. Under state tire fee systems, retailers deposit funds collected from consumers into a state government account. In addition, when the state fee is paid at retail, most states allow retailers to keep a portion of this fee to help cover costs of scrap tire recycling and disposal. These fees only cover a portion of the total scrap tire management costs. Aside from the state tire fee, many retailers impose their own scrap tire charge on consumers (most state programs allow this). This can help retailers pay for their full costs of end-of-life management of scrap tires, as the portion of the state tire fee received by the retailer, if any, may not cover all costs. Furthermore, tire fees imposed on consumers are a contributing factor to illegal dumping of scrap tires.

State Grants: Some states provide funding to local governments to help fund the disposal of HHW. These may be provided every year or on a more ad hoc basis and may vary in funding level from year to year. However, these funding programs may be intermittent and do not always cover the full costs of HHW management. The Vermont DEC currently provides \$400,000 in grants to municipalities to help fund HHW disposal.

Voluntary Industry Stewardship Programs: Voluntary industry stewardship programs exist for a range of products, including mercury thermostats and batteries. These programs provide free recycling of these products and supply a degree of education and outreach as well. Current voluntary mercury thermostat and household battery stewardship programs that operate in states without legislated EPR tend to have lower recycling rates than legislated programs. In the particular case of batteries stewardship, voluntary programs do not provide a level playing field for industry (free riders are imposing significant costs to the program).

8. Conclusion

This report examines the potential effects of Vermont’s HHW EPR bill on product manufacturers as well as local and state governments, effects that include costs, cost savings, collection convenience, and material diversion from improper disposal. Program and financing models other than EPR are also assessed for their ability to increase consumer convenience, reduce municipal costs, and reap other benefits. The content of bill H.560 was also reviewed to identify recommendations for effective, efficient implementation of the HHW EPR program as set out in the bill.

Findings of the report reveal that it is likely that hundreds of manufacturers and their products will be included in bill H.560. This is not unlike several existing EPR programs for HHW in Canada (Product Care works with around 200 producers in Canada) and for other product areas in the U.S. and Canada. For example, the PaintCare program involves hundreds of paint producers in eight U.S. states (including Vermont) and Washington DC. Call2Recycle works with over 250 battery producers in the U.S. (also in Vermont) and over 300 producers in Canada. The Electronics Product Recycling Association works with more than 7,000 producers (including manufacturers, distributors, retailers, and resellers) in Canada and RecycleBC, also in Canada, works with 1,100 producers. Based on recent research PSI conducted that involved interviewing those operating or overseeing EPR programs that include many producers and products, EPR programs with very large numbers of products and manufacturers have been successfully operating across a range of product areas, including HHW, and can reasonably be expected to be successfully implemented in Vermont.

Capital costs for the program are estimated to range from \$3 million to \$11 million for the two scenarios presented in this report. However, these may be subject to change given that it is possible to conceive of multiple alternate scenarios than those presented. Annual operating costs are estimated to range from \$1.6 million to \$3.1 million. State agency costs are not expected to be significantly different from those incurred for administering and enforcing existing EPR programs in the state. Local government annual operating cost savings and stewardship organization operating costs are expected to be in the range of \$400,000 to \$860,000. These local government cost savings will be funded by the manufacturers through the stewardship organization and therefore, these are costs that the stewardship organization will incur.

Bill H.560 is already well-designed to provide for effective and efficient implementation of an EPR for HHW program but may be further modified to refine key elements. As shown above, EPR programs can provide significant benefits in terms of collection convenience. Overall, the impacts of the bill are not significantly unlike those that Vermont has experienced from implementation of its other EPR laws, through which it has achieved considerable success, including national prominence in its achievements.

Findings in Bill H.560 as passed by the House indicate that *“there is general agreement among the SWMEs [Solid Waste Management Entities] and the Agency of Natural Resources that additional collection sites and education and information activities are necessary to capture more of the HHW being disposed of in landfills.”* In addition, *“funding constraints are a current barrier to new collection sites and education and*

informational activities.” Beyond municipal cost reduction and increased convenience, education and funding are identified by state and local governments as key issues that also need to be addressed. When compared to the alternative models reviewed above, EPR is the only approach that addresses all four desired programmatic aspects -- relieves local governments of the financial burden of HHW, increases convenient collection for residents, increases awareness through education and outreach, and provides sustainable funding. Furthermore, sustainably funded EPR programs not only provide continuity of collection and recycling/disposal services to residents, but also are more likely to ensure that these services are accessible to residents throughout the state, not just in urban or more highly populated areas. These are all key elements to increasing the environmentally sound collection and management of HHW in Vermont to advance the protection of Vermont’s environment and public health.

9. References

Abt Associates, 2007. [Quantifying the Disposal of Post-Consumer Architectural Paint](#), Prepared for U.S. Environmental Protection Agency, April 2007.

Addison County Solid Waste Management District. 2015. *Household Hazardous Waste Workshop*. Presentation at the North American Hazardous Materials Management Association Northeast Annual Meeting, New Hampshire Municipal Association, Concord, NH.

An Act Relating to Household Products containing Hazardous Substances, [H.560 Official \(as passed by the House\)](#), 2017-2018 Session, Vermont Legislature.

Bartlett, Veronica, Christin Seidel, and Glenda Gies. 2016. [Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs Operating in BC in 2014](#). Presented to British Columbia Ministry of Environment by Morrison Hershfield, Report No. 5160206, November 30, 2016.

Cascadia Consulting Group, 2012, *Producer Responsibility Scenario Analysis: Product Stewardship in Oregon and Expected Implications for Metro's Hazardous Waste Program*, prepare for Metro, December 2012.

Champaign County Regional Planning Commission, 2015, [Strategy for Improving Household Hazardous Waste Collection Options in East Central Illinois: Phase Three Report](#), Draft Final Report, March 31, 2015.

City of Lincoln and Lincoln-Lancaster County Health Department, 2017, [Hazardous Materials Collection Center for Households & Small Businesses](#), Presentation at Lincoln-Lancaster County Health Department Board of Health Meeting, June 13th, 2017.

Clincke, Kyla. 2018. Personal communication (email), Saskatchewan Ministry of Environment, September 11, 2018.

Duncan Bury Consulting, 2012, *Overview of Stewardship and Extended Producer Responsibility Job and Economic Impact Studies*, Prepared for the Western Product Stewardship Collaborative, August 2012.

Fichtner, Konrad, Veronica Bartlett, Christina Seidel, Glenda Gies, and Maura Walker. 2014. [Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs in BC](#), Presented to the British Columbia Ministry of Environment, Report No. 513096600, February 5, 2014.

gbA Architecture & Planning, 2015. *New Facility Study: Programming, Preliminary Building Costs, and Feasibility*, prepared for Central Vermont Solid Waste Management District, October 7, 2015, Revised October 26, 2015.

HDR Engineering, Inc. 2000. [Development Study for A Household Hazardous Waste Facility, Final Report](#). Prepared for Metropolitan Planning Agency, City of Omaha, Douglas County, Sarpy County, Papio-Missouri River Natural Resources District, Keep Omaha Beautiful. January 2000.

Holliday, Jen. 2018. Personal communication (email), Chittenden Solid Waste Management District FY 17 Annual HHW Collection Data, November 14, 2018.

PSI | February 7, 2019
Final Report for VT DEC – Research on EPR for HHW Programs

Holliday, Jen. 2017. [Chittenden Solid Waste District Hazardous Waste Collection Program](#), presented at 2017 VT HHW Stakeholder Group Meeting - June 22, 2017.

Islam, Faisal. 2018. Personal communication (email), Manitoba Sustainable Development, September 12, 2018.

Karidis, Arlene. 2018. [Mesa, Ariz. Launches Household Hazardous Waste Facility](#), Waste 360, November 15, 2018.

Kurschner, Mark, 2016. *HHW EPR Programs in Canada*, Presentation for Product Stewardship for HHW Stakeholder Outreach Meeting #1, January 25, 2016, Portland, Oregon.

Maine Department of Environmental Protection, 2017, [Implementing Product Stewardship in Maine](#), Report to the Joint Standing Committee on Environment and Natural Resources, 128th Legislature, First Session. February 2017.

Metro, Presentation on *Product Stewardship for Household Hazardous Waste Stakeholder Meeting #2*, April 12, 2016, Metro Regional Center.

Metro, *HB 4126 – Statewide Product Stewardship for Household Hazardous Wastes: Frequently Asked Questions*, 2018.

Nightingale, David, 2018, *Evolution of HHW/CESQG Collection Facilities and Keys to Sustaining Progress*, Presentation at North American Hazardous Materials Management Association Annual Conference, Portland, ME, August 30, 2018.

Nightingale, David. 2009. *HHW Collection Facility Design Guide: Charting Your Path Through the Household Hazardous Waste Facility Design Process*, HHWPlus/Special Waste Associates, Olympia, WA, November 2009.

Patrick Engineering, 2009, [Household Hazardous Waste Facility Feasibility Study](#), Prepared for Peoria County Office of Health and Human Services Recycling and Resource Conservation, December 2009.

Product Care Association, 2010, [Manitoba Household Hazardous Waste Stewardship Program Plan for the Period April 1, 2011 to March 31, 2016](#), August 26, 2010.

Product Care Association, 2015, [Ontario Pesticides, Solvents and Fertilizers Industry Stewardship Plan 2016-2020](#), May 15, 2015.

Product Care Association, [British Columbia Paint and Household Hazardous Waste \(HHW\) Product Stewardship Plan – 2012-2016](#).

Product Care Association, 2017, [Manitoba Paint and HHW Accepted and Not Accepted Products Lists for PCA Members](#), November 30, 2017.

Product Care Association of Canada, 2018, [Ontario Industry Stewardship Program 2017 Annual Report](#).

Product Care Association of Canada, 2018. [British Columbia Paint and Household Hazardous Waste Stewardship Program, Annual Report to the Director 2017](#), June 27, 2018.

Product Care Association of Canada. 2018. [Manitoba Household Hazardous Waste Annual Report 2017](#), May 2, 2018.

Product Care Association of Canada, 2001 *British Columbia Stewardship Summary Report*.

Product Care Association of Canada. 2018. [Manitoba Household Hazardous Waste Annual Report 2017](#), May 2, 2018.

Product Care, 2018. [British Columbia Paint and Household Hazardous Waste Stewardship Plan](#), Revised and submitted August 31, 2018.

Product Care Association of Canada, 2018. [British Columbia Paint and Household Hazardous Waste Stewardship Program, Annual Report to the Director 2017](#), June 27, 2018.

Product Care Association of Canada. *Manitoba Household Hazardous Waste (HHW) 2012 Program Year Annual Report*.

Product Stewardship Institute, Product Policy Institute, and California Product Stewardship Council. 2012. [Product Stewardship and Extended Producer Responsibility Definitions and Principles](#), February 21, 2012.

Product Stewardship Institute, 2018, *Supporting EPR for HHW in Oregon: Operational Feasibility Study*, Prepared for Metro (Oregon), November 5, 2018.

Product Stewardship Institute, 2017. [Canadian EPR for HHW Programs: Cost and Collection Quantities Summary, 2014-2016](#). July 14, 2017.

Product Stewardship Institute, 2017, *Connecticut Extended Producer Responsibility Program Evaluation: Summary and Recommendations*, January 2017.

Product Stewardship Institute. 2015. *Extended Producer Responsibility for Household Hazardous Waste: Phase II Study*, Final Report, April 14, 2015.

Product Stewardship Institute, 2015, *Paint Stewardship: Effects on Household Hazardous Waste Programs*, Prepared for Paint Care, December 16, 2015.

Product Stewardship Institute. 2014. *Extended Producer Responsibility for Household Hazardous Waste: Phase I Research*, Final Report, July 22, 2014.

Quinn, Jim, 2013. Presentation on *Overview of: Producer Responsibility Scenario Analysis: Product Stewardship in Oregon and Expected Implications for Metro's Hazardous Waste Program* by Cascadia Consulting Group, March 2013.

Quinn, Jim, and Scott Klag, 2015. [Product Stewardship for Household Hazardous Wastes: Overview of HB 3251-1](#), Submitted by Jim Quinn and Scott Klag on House Bill 3251, House Committee on Energy and the Environment, May 14, 2015.

Roethlein, Mia. 2018. Personal communication (email), Vermont Department of Environmental Conservation, November 7, 2018.

Roethlein, Mia. 2019. Personal communication (email), Vermont Department of Environmental Conservation, January 28, 2019.

Smarter Sorting. 2019. *Chittenden Most Diverted Products spreadsheet*, provided by Chittenden Solid Waste District to the Product Stewardship Institute, January 7, 2019.

Solid Waste Management Program, Department of Environmental Conservation, Vermont Agency of Natural Resources, 2017, [Household Hazardous Waste Stakeholder Group Final Summary Report](#), November 15, 2017.

Special Waste Associates, 2017, [Household Hazardous Waste Facility Readiness and Programming Report prepared for Upper Valley Lake Sunapee Regional Planning Commission](#), November 2017.

Stein, Andy, Patricia Garland, and Saritha Ramakrishna, 2014, *Feasibility of a Permanent Household Hazardous Waste Facility*: Mesa, AZ, December 2014;

Vermont Agency of Natural Resources, Department of Environmental Conservation, 2017, *Biennial Report on Solid Waste*, Submitted to the House and Senate Committees on Natural Resources and Energy, January 3, 2017.

Vermont Agency of Natural Resources, Department of Environmental Conservation, 2019, *DRAFT Biennial Report on Solid Waste*, Submitted to the House and Senate Committees on Natural Resources and Energy, 2018.

Vermont Agency of Natural Resources, Department of Environmental Conservation, 2014, [Vermont Materials Management Plan: Moving from Solid Waste towards Sustainable Management](#), Effective date June 18, 2014.

Vermont Agency of Natural Resources, Department of Environmental Conservation, 2013. [Report to the Vermont Legislature on Problem of Scrap Tire Piles](#), January 8, 2013.

Vermont Department of Environmental Conservation, *2016 HHW Cost Survey Results*, Available on [Vermont Agency of Natural Resources 2017 Household Hazardous Waste Stakeholder Group Meetings website](#), accessed November 13, 2018.

Walsh, Jim, 2018. [Mesa Joins EV Trend: Will Open Facility to Recycle Hazardous Wastes](#), East Valley Tribune, January 2, 2018;

Zecchini, Gemma. 2011. [Lessons Learned: Ontario's Recent Experience with MHSW & EPR, Presented at the 2011 Conference on Canadian Stewardship](#), Halifax, Nova Scotia, September 20, 2011.

10. Appendix

In-Text Links

- [HB 2772](https://olis.leg.state.or.us/liz/2019R1/Measures/Overview/HB2772) – <https://olis.leg.state.or.us/liz/2019R1/Measures/Overview/HB2772>
- [SB 96](https://olis.leg.state.or.us/liz/2019R1/Measures/Overview/SB96) – <https://olis.leg.state.or.us/liz/2019R1/Measures/Overview/SB96>
- [H.560](https://legislature.vermont.gov/bill/status/2018/H.560) - <https://legislature.vermont.gov/bill/status/2018/H.560>
- [HB 4126](https://olis.leg.state.or.us/liz/2018R1/Measures/Overview/HB4126)- <https://olis.leg.state.or.us/liz/2018R1/Measures/Overview/HB4126>
- [HB 4126 A-Engrossed](https://olis.leg.state.or.us/liz/2018R1/Downloads/MeasureDocument/HB4126/A-Engrossed)- <https://olis.leg.state.or.us/liz/2018R1/Downloads/MeasureDocument/HB4126/A-Engrossed>
- [HB 3105](https://olis.leg.state.or.us/liz/2017R1/Measures/Overview/HB3105)- <https://olis.leg.state.or.us/liz/2017R1/Measures/Overview/HB3105>
- [HB 3251](https://olis.leg.state.or.us/liz/2015R1/Measures/Overview/HB3251)- <https://olis.leg.state.or.us/liz/2015R1/Measures/Overview/HB3251>
- [Household & Commercial Products Association](https://www.thehcpa.org/) (HCPA) – <https://www.thehcpa.org/>
- [Manitoba Paint and HHW Accepted and Not Accepted Products Lists for PCA Members](https://www.productcare.org/app/uploads/2018/12/MB-Paint-and-HHW-Accepted-Products-List-1.pdf) – <https://www.productcare.org/app/uploads/2018/12/MB-Paint-and-HHW-Accepted-Products-List-1.pdf>
- [American Cleaning Institute](https://www.cleaninginstitute.org/) (ACI) – <https://www.cleaninginstitute.org/>
- Hartford Vermont Recycling and Waste Management Center [evaluated in 2017](http://hhw.uvlsrpc.org/files/9515/4585/4518/HHW_Readiness_and_Programming_Report_FINAL.pdf) - http://hhw.uvlsrpc.org/files/9515/4585/4518/HHW_Readiness_and_Programming_Report_FINAL.pdf

ⁱ The Vermont Product Stewardship Council is an organization of local governments that work with State government, waste and recycling companies, water quality organizations, businesses, non-profit organizations, and product consumers to promote product stewardship policies and practices. Members include:

Chittenden Solid Waste District – Jen Holliday
Addison County Solid Waste District – Teresa Kuczynski
Central Vermont Solid Waste Management District – Leesa Stewart
Greater Upper Valley Solid Waste District – Tom Kennedy
Windham Solid Waste District – Bob Spencer
Lamoille Regional Solid Waste Management District – Susan Alexander
Mad River Resource Management Alliance – John Malter
Northeast Kingdom Waste Management District – Marcus Berry
Rutland County Solid Waste District – James O’Gorman
Solid Waste Alliance Communities – Pamela Clapp
Southern Windsor/Windham Counties Solid Waste Management District – Mary O’Brien
Northwest Solid Waste Management District – John Leddy
Londonderry Solid Waste Group – Esther Fishman
White River Alliance – Chet Brown
Bennington County Regional Commission – Michael Batcher
Town of Burke – Sam Sanderson

ⁱⁱ Product Stewardship Institute, Product Policy Institute, and California Product Stewardship Council. 2012. [Product Stewardship and Extended Producer Responsibility Definitions and Principles](#), February 21, 2012.

ⁱⁱⁱ Local government cost savings will be funded by the manufacturers through the stewardship organization. Section 7183(b)(3)(A) of H.560 requires that the stewardship plan allow all municipalities to decide if their collection programs and facilities will be part of the stewardship organization's collection plan. Manufacturers may establish collection programs for products covered under H.560 separate from municipal collection programs and facilities that are not part of the stewardship organization's collection plan. In this case, manufacturers would incur the total capital costs in Section 4.1 and operating costs commensurate with the scope of products they collect. Although the stewardship organization's portion of the cost is expected to be 25 to 28 percent of the total estimated costs, it is possible that 100 percent of the collection infrastructure would need to be funded (where there are no existing facilities) in order to meet the convenience standard outlined in H.560. However, if manufacturers partner with local governments, a portion of those costs could be covered.

^{iv} Product Stewardship Institute, Product Policy Institute, and California Product Stewardship Council. 2012. [Product Stewardship and Extended Producer Responsibility Definitions and Principles](#), February 21, 2012.

^v Covered product does not mean a primary battery or rechargeable battery, a lamp that contains mercury, a thermostat that contains mercury, architectural paint as that term is defined in section 6672 of this chapter, covered electronic devices as that term is defined in section 7551 of this title, a pharmaceutical drug, a pesticide regulated by the Secretary of Agriculture, Food and Markets, or products that are intended to be rubbed, poured, sprinkled on, sprayed on, introduced into, or otherwise applied to the human body or any part of a human for cleansing, moisturizing, sun protection, beautifying, promoting attractiveness, or altering appearance, unless designated as a hazardous material or a hazardous waste by the Secretary of Natural Resources.

^{vi} Smarter Sorting. 2019. *Chittenden Most Diverted Products spreadsheet*, provided by Chittenden Solid Waste District to the Product Stewardship Institute, January 7, 2019.

^{vii} "Covered product" does not mean:

- (i) A primary battery or rechargeable battery.
- (ii) A lamp that contains mercury.
- (iii) A thermostat that contains mercury.
- (iv) Architectural paint as that term is defined in section 6672 of this chapter.
- (v) Covered electronic devices as that term is defined in section 7551 of this title.
- (vi) A pharmaceutical drug.
- (vii) A pesticide regulated by the Secretary of Agriculture, Food and Markets.
- (viii) Products that are intended to be rubbed, poured, sprinkled on, sprayed on, introduced into, or otherwise applied to the human body or any part of a human for cleansing, moisturizing, sun protection, beautifying, promoting attractiveness, or altering appearance, unless designated as a hazardous material or a hazardous waste by the Secretary of Natural Resources.

^{viii} This cost information is intended to provide an overview of the approximate range of costs that would likely be incurred in implementation of H.560. A detailed cost analysis of the program has not been conducted.

^{ix} Note that Vermont has EPR programs for a number of products -- auto switches, primary batteries, electronics, fluorescent lamps, paint, and thermostats -- whose management costs are covered to varying degrees by stewardship organizations. Vermont's pesticide registration program also provides funding for end-of-life management for unwanted household pesticides. These program costs and savings have not been tabulated as part of this analysis.

^x The number of collection events was provided by Vermont Department of Environmental Conservation in a personal email communication to PSI on January 9, 2019. These events are to be held to meet requirements under [Vermont's Materials Management Plan, 2014](#).

^{xi} Vermont Department of Environmental Conservation, 2016 HHW Cost Survey Results, Available on [Vermont Agency of Natural Resources 2017 Household Hazardous Waste Stakeholder Group Meetings website](#), accessed November 13, 2018; Roethlein, Mia, Vermont Department of Environmental Conservation. Personal Interview. November 15, 2018.

^{xii} Vermont Department of Environmental Conservation, 2016 HHW Cost Survey Results, Available on [Vermont Agency of Natural Resources 2017 Household Hazardous Waste Stakeholder Group Meetings website](#), accessed November 13, 2018; Roethlein, Mia, Vermont Department of Environmental Conservation. Personal Interview. November 15, 2018.

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- ^{xiii} Vermont Department of Environmental Conservation, 2016 HHW Cost Survey Results, Available on [Vermont Agency of Natural Resources 2017 Household Hazardous Waste Stakeholder Group Meetings website](#), accessed November 13, 2018.
- ^{xiv} Vermont Department of Environmental Conservation, 2016 HHW Cost Survey Results, Available on [Vermont Agency of Natural Resources 2017 Household Hazardous Waste Stakeholder Group Meetings website](#), accessed November 13, 2018.
- ^{xv} Vermont Department of Environmental Conservation, 2016 HHW Cost Survey Results, Available on [Vermont Agency of Natural Resources 2017 Household Hazardous Waste Stakeholder Group Meetings website](#), accessed November 13, 2018.
- ^{xvi} The number of collection events was provided by Vermont Department of Environmental Conservation in a personal email communication to PSI on January 9, 2019. These events are to be held to meet requirements under [Vermont's Material Management Plan, 2014](#).
- ^{xvii} The number of collection events was provided by Vermont Department of Environmental Conservation in a personal email communication to PSI on January 9, 2019. These events are to be held to meet requirements under [Vermont's Material Management Plan, 2014](#).
- ^{xviii} Vermont Agency of Natural Resources, 2014, [Vermont Materials Management Plan: Moving from Solid Waste towards Sustainable Management](#). Effective date June 18, 2014.
- ^{xix} Vermont Department of Environmental Conservation, 2016 HHW Cost Survey Results, Available on [Vermont Agency of Natural Resources 2017 Household Hazardous Waste Stakeholder Group Meetings website](#), accessed November 13, 2018.
- ^{xx} David Nightingale, Special Waste Associates. Personal Interview. November 27, 2018; David Nightingale, Special Waste Associates. Personal Interview. December 14, 2018.
- ^{xxi} Champaign County Regional Planning Commission, 2015, *Strategy for Improving Household Hazardous Waste Collection Options in East Central Illinois: Phase Three Report*, Draft Final Report, March 31, 2015; Special Waste Associates, 2017, *Household Hazardous Waste Facility Readiness and Programming Report prepared for Upper Valley Lake Sunapee Regional Planning Commission*, November 2017; Stein, Andy, Patricia Garland, and Saritha Ramakrishna, 2014, *Feasibility of a Permanent Household Hazardous Waste Facility*: Mesa, AZ, December 2014; Patrick Engineering, 2009, *Household Hazardous Waste Facility Feasibility Study*, Prepared for Peoria County Office of Health and Human Services Recycling and Resource Conservation, December 2009; Nightingale, David, 2018, *Evolution of HHW/CESQG Collection Facilities and Keys to Sustaining Progress*, Presentation at North American Hazardous Materials Management Association Annual Conference, Portland, ME, August 30, 2018; Karidis, Arlene. 2018. [Mesa, Ariz. Launches Household Hazardous Waste Facility](#), Waste 360, November 15, 2018; Walsh, Jim, 2018. [Mesa Joins EV Trend: Will Open Facility to Recycle Hazardous Wastes](#), East Valley Tribune, January 2, 2018; City of Lincoln and Lincoln-Lancaster County Health Department, 2017, [Hazardous Materials Collection Center for Households & Small Businesses](#), Presentation at Lincoln-Lancaster County Health Department Board of Health Meeting, June 13th, 2017; Product Care Association of Canada. 2018. [Manitoba Household Hazardous Waste Annual Report 2017](#), May 2, 2018.
- ^{xxii} Addison County Solid Waste Management District. 2015. *Household Hazardous Waste Workshop*. Presentation at the North American Hazardous Materials Management Association Northeast Annual Meeting, New Hampshire Municipal Association, Concord, NH; Champaign County Regional Planning Commission, 2015, [Strategy for Improving Household Hazardous Waste Collection Options in East Central Illinois: Phase Three Report](#), Draft Final Report, March 31, 2015. Patrick Engineering, 2009, [Household Hazardous Waste Facility Feasibility Study](#), Prepared for Peoria County Office of Health and Human Services Recycling and Resource Conservation, December 2009; HDR Engineering, Inc. 2000. [Development Study for A Household Hazardous Waste Facility, Final Report](#). Prepared for Metropolitan Planning Agency, City of Omaha, Douglas County, Sarpy County, Papio-Missouri River Natural Resources District, Keep Omaha Beautiful. January 2000; gbA Architecture & Planning, 2015. *New Facility Study: Programming, Preliminary Building Costs, and Feasibility*, prepared for Central Vermont Solid Waste Management District, October 7, 2015, Revised October 26, 2015.
- ^{xxiii} For more information on how Chittenden Solid Waste District's participation rate, in particular, has increased over time, see Special Waste Associates, 2017, [Household Hazardous Waste Facility Readiness and Programming Report prepared for Upper Valley Lake Sunapee Regional Planning Commission](#), November 2017, p.12.

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- ^{xxiv} Special Waste Associates, 2017, [Household Hazardous Waste Facility Readiness and Programming Report prepared for Upper Valley Lake Sunapee Regional Planning Commission](#), November 2017.
- ^{xxv} Product Care Association of Canada. 2018. [Manitoba Household Hazardous Waste Annual Report 2017](#), May 2, 2018.
- ^{xxvi} An Act Relating to Household Products containing Hazardous Substances, [H.560 Official \(as passed by the House\)](#), 2017-2018 Session, Vermont Legislature.
- ^{xxvii} Roethlein, Mia. 2019. Personal communication (email), Vermont Department of Environmental Conservation, January 28, 2019.
- ^{xxviii} This is provided as an approximation of costs as the weight of a material may not equate with management and disposal and recycling cost. A relatively small amount of a highly toxic material could incur significantly greater costs to manage than a large amount of another material.
- ^{xxix} Vermont Department of Environmental Conservation, 2016 HHW Cost Survey Results, Available on [Vermont Agency of Natural Resources 2017 Household Hazardous Waste Stakeholder Group Meetings website](#); Holliday, Jen. 2018. Personal communication, Chittenden Solid Waste Management District FY 17 Annual HHW Collection Data, November 14, 2018; Holliday, Jen. 2017. [Chittenden Solid Waste District Hazardous Waste Collection Program](#), presented at 2017 VT HHW Stakeholder Group Meeting - June 22, 2017; Cascadia Consulting Group, 2012, *Producer Responsibility Scenario Analysis: Product Stewardship in Oregon and Expected Implications for Metro's Hazardous Waste Program*, prepare for Metro, December 2012; Nightingale, David. 2009. *HHW Collection Facility Design Guide: Charting Your Path Through The Household Hazardous Waste Facility Design Process*, HHWPlus/Special Waste Associates, Olympia, WA, November 2009. Special Waste Associates, 2017, [Household Hazardous Waste Facility Readiness and Programming Report prepared for Upper Valley Lake Sunapee Regional Planning Commission](#), November 2017.
- ^{xxx} The low estimate of the ranges totals 87 percent and the high estimate of the ranges totals 113 percent for an average of 100 percent.
- ^{xxxi} Jim Quinn, Metro OR, Presentation on *Overview of: Producer Responsibility Scenario Analysis: Product Stewardship in Oregon and Expected Implications for Metro's Hazardous Waste Program* by Cascadia Consulting Group, March 2013; Cascadia Consulting Group, 2012, *Producer Responsibility Scenario Analysis: Product Stewardship in Oregon and Expected Implications for Metro's Hazardous Waste Program*, prepare for Metro, December 2012.
- ^{xxxii} An Act Relating to Household Products containing Hazardous Substances, [H.560 Official \(as passed by the House\)](#), 2017-2018 Session, Vermont Legislature.
- ^{xxxiii} Product Stewardship Institute, 2015, *Paint Stewardship: Effects on Household Hazardous Waste Programs*, Prepared for Paint Care, December 16, 2015.
- ^{xxxiv} Roethlein, Mia. 2018. Personal communication (email), Vermont Department of Environmental Conservation, November 7, 2018; Islam, Faisal. 2018. Personal communication (email), Manitoba Sustainable Development, September 12, 2018; Clincke, Kyla. 2018. Personal communication (email), Saskatchewan Ministry of Environment, September 11, 2018.
- ^{xxxv} Official Bill H.560 as passed by the House Section 4. Agency of Natural Resources Recommendation of Registration Fee for Covered Household Hazardous Products – “*On or before January 15, 2021, the Secretary of Natural Resources shall submit to the House Committees on Ways and Means and on Natural Resources, Fish, and Wildlife and the Senate Committees on Finance and on Natural Resources and Energy a recommended fee for the registration of stewardship organizations under the covered household hazardous product program under 10 V.S.A. chapter 164B.*”
- ^{xxxvi} Oregon bill [HB 4126 A-Engrossed](#) provides examples of language that might be used.
- ^{xxxvii} Product Care Association of Canada, *2001 BC Stewardship Summary Report.*; Product Care Association of Canada. *MB Household Hazardous Waste (HHW) 2012 Program Year Annual Report.*; Product Care Association of Canada. 2018. [Manitoba Household Hazardous Waste Annual Report 2017](#), May 2, 2018.; Product Care Association of Canada, 2018. [British Columbia Paint and Household Hazardous Waste Stewardship Program, Annual Report to the Director 2017](#), June 27, 2018.
- ^{xxxviii} Product Care, 2018. [British Columbia Paint and Household Hazardous Waste Stewardship Plan](#), Revised and submitted August 31, 2018.

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- ^{xxxix} Bartlett, Veronica, Christin Seidel, and Glenda Gies. 2016. [Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs Operating in BC in 2014](#). Presented to British Columbia Ministry of Environment by Morrison Hershfield, Report No. 5160206, November 30, 2016.
- ^{xl} Bartlett, Veronica, Christin Seidel, and Glenda Gies. 2016. [Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs Operating in BC in 2014](#). Presented to British Columbia Ministry of Environment by Morrison Hershfield, Report No. 5160206, November 30, 2016, p.2.
- ^{xli} Bartlett, Veronica, Christin Seidel, and Glenda Gies. 2016. [Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs Operating in BC in 2014](#). Presented to British Columbia Ministry of Environment by Morrison Hershfield, Report No. 5160206, November 30, 2016, p.2.
- ^{xlii} Bartlett, Veronica, Christin Seidel, and Glenda Gies. 2016. [Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs Operating in BC in 2014](#). Presented to British Columbia Ministry of Environment by Morrison Hershfield, Report No. 5160206, November 30, 2016, p.2.
- ^{xliii} Product Care, 2017. *2018 Lab Pack Factors for Pesticides, Solvents, Fertilizers, and Aerosols*.
- ^{xliiii} Bartlett, Veronica, Christin Seidel, and Glenda Gies. 2016. [Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs Operating in BC in 2014](#). Presented to British Columbia Ministry of Environment by Morrison Hershfield, Report No. 5160206, November 30, 2016; Fichtner, Konrad, Veronica Bartlett, Christina Seidel, Glenda Gies, and Maura Walker. 2014. [Assessment of Economic and Environmental Impacts of Extended Producer Responsibility Programs in BC](#), Presented to British Columbia Ministry of Environment, Report No. 513096600, February 5, 2014.
- ^{xliv} Jim Quinn, Metro OR, Presentation on *Overview of: Producer Responsibility Scenario Analysis: Product Stewardship in Oregon and Expected Implications for Metro's Hazardous Waste Program* by Cascadia Consulting Group, March 2013.
- ^{xliv} [Vermont Materials Management Plan: Moving from Solid Waste towards Sustainable Management](#), Effective date June 18, 2014, p.41.
- ^{xlvi} Vermont Agency of Natural Resources, Department of Environmental Conservation, 2017, *Biennial Report on Solid Waste*, Submitted to the House and Senate Committees on Natural Resources and Energy, January 3, 2017.; Vermont Agency of Natural Resources, Department of Environmental Conservation, 2019, *DRAFT Biennial Report on Solid Waste*, Submitted to the House and Senate Committees on Natural Resources and Energy, 2018.; [Vermont Materials Management Plan: Moving from Solid Waste towards Sustainable Management](#), Effective date June 18, 2014.
- ^{xlvii} Maine Department of Environmental Protection, 2017, [Implementing Product Stewardship in Maine](#), Report to the Joint Standing Committee on Environment and Natural Resources, 128th Legislature, First Session. February 2017.
- ^{xlviii} Product Stewardship Institute, 2017, *Connecticut Extended Producer Responsibility Program Evaluation: Summary and Recommendations*, January 2017.
- ^{xlix} Duncan Bury Consulting, 2012, *Overview of Stewardship and Extended Producer Responsibility Job and Economic Impact Studies*, Prepared for the Western Product Stewardship Collaborative, August 2012.
- ¹ An Act Relating to Household Products containing Hazardous Substances, [H.560 Official \(as passed by the House\)](#), 2017-2018 Session, Vermont Legislature.
- ⁱⁱ Product Care Association of Canada, *2001 BC Stewardship Summary Report*.; Product Care Association of Canada. *MB Household Hazardous Waste (HHW) 2012 Program Year Annual Report*.; Product Care Association of Canada. 2018. *Manitoba Household Hazardous Waste Annual Report 2017*, May 2, 2018.; Product Care Association of Canada, 2018. [British Columbia Paint and Household Hazardous Waste Stewardship Program, Annual Report to the Director 2017](#), June 27, 2018.
- ⁱⁱⁱ Product Care, 2018. [British Columbia Paint and Household Hazardous Waste Stewardship Plan](#), Revised and submitted August 31, 2018.